THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.

Published for the Collector, Historian and Old Time Wireless Operator

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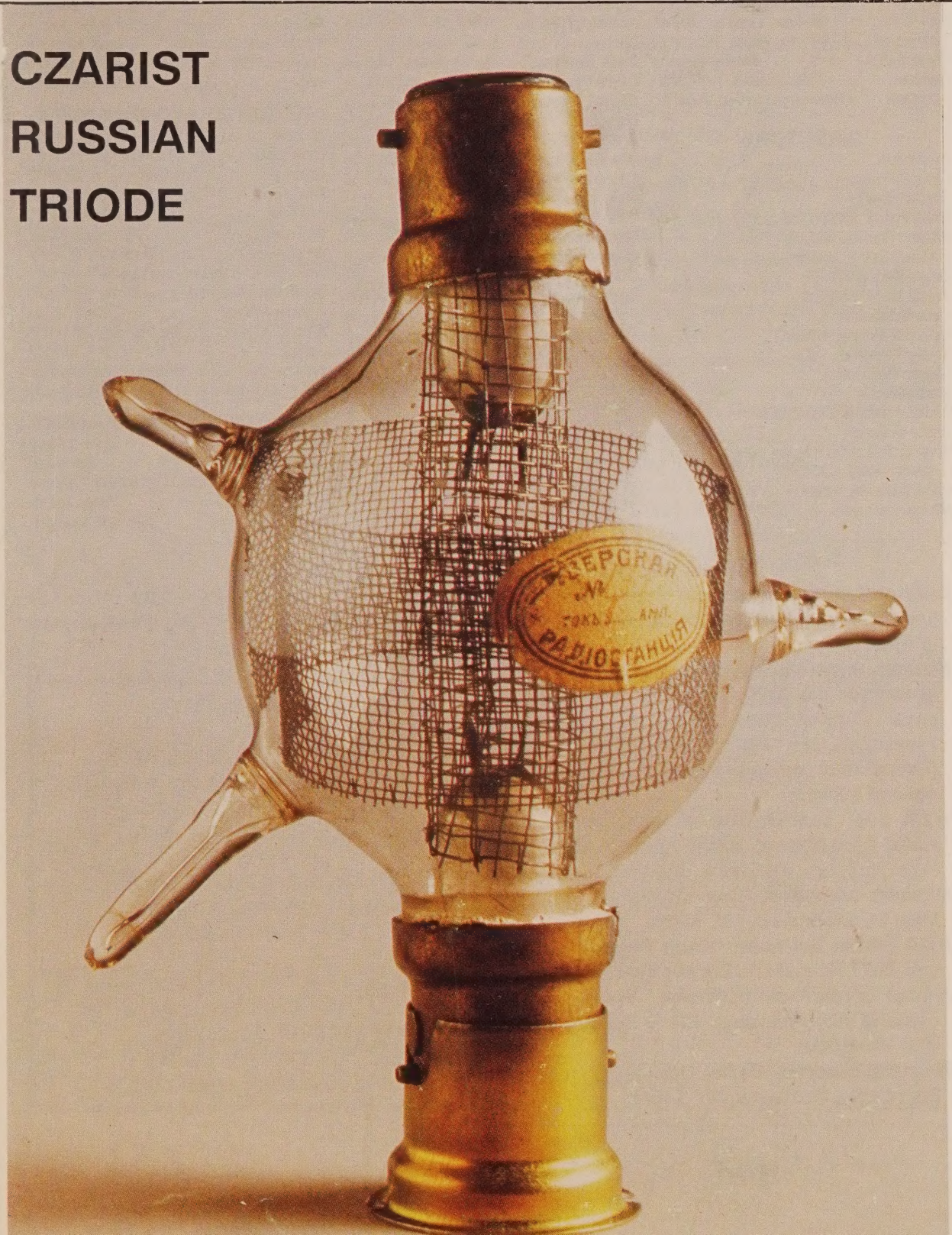
CZARIST RUSSIAN TRIODE



ANTIQUE WIRELESS ASSOCIATION, INC.

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The "Old Timer's Bulletin": The AWA Journal

The *Old Timer's Bulletin* is published approximately four times a year, on a volunteer basis, by and for members of the Antique Wireless Association, Inc. AWA is a nonprofit historical society founded in 1952 and chartered by the State of New York. The *Old Timer's Bulletin* is available only as part of AWA membership. Its issuance is subject to change from time to time as to frequency, content, and size. This publication does not accept paid advertising. It is not liable in any way for any buying and selling transaction entered into as a result of its contents.

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Equipment Awards: Ralph Williams
Taylor Award: Ross Smith
Tyne Award: Lauren Peckham

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Please write legibly. Enclosing an SASE speeds replies.

Dues and address changes: Joyce Peckham (Secretary), Box E, Breesport, NY 14816, (607) 739-5443. Dues: 1 year, $12; 2 years, $22; 3 years, $33; overseas (airmail), $15. Make check payable to AWA.

Bulletin material; news of non-joint meets; orders for the AWA Review or OTB back issues: Ludwell Sibley (Editor), 44 E. Main St., Flemington, NJ 08822-1224, (908) 782-4894. **(Exception: column material should go to column editors.)**

Want ads, coordination of joint meets and slide/video shows: Richard Ransley (First Vice President), Box 41, Sodus, NY 14551.

Museum operation: Bruce Kelley (Curator), 59 Main St., Bloomfield, NY 14469.

AWA official business: Bruce Roloson (President), 2577 Rittmer Ln., Seneca Falls, NY 13418.

Annual conference business: William Fizette (Second Vice President), RD 1, Box 55, Henryville, PA 18332.

Financial reports: Dexter Deeley (Treasurer), 8 Briar Circle, Rochester, NY 14618.

AWA NETS (EST)

PHONE:

Sun. 7247 kHz SSB, noon (NCS N4FS)
3837 kHz, QRP & AM, 5 PM, Nov. thru April (NCS: W2ICE & AA2CU)

Tues. 14274 kHz SSB, 2:30 PM (NCS: KC3YE and W0FXY))
3837 kHz SSB, 8 PM (NCS N4FS)

Mon.-Wed.-Fri. 3867 kHz, 9:30 AM (NCS W2ICE and W2SHN)

CW:

Daily, 4 PM, 7050 kHz (NCS varies)
First Wed. of each month, 8 PM, 7050

2-M REPEATER (Rochester area):
Mon., 7:30 PM (NCS: W2ICE)
Receive 146.820; transmit 146.220

FROM THE EDITOR

Ludwell Sibley, KB2EVN

THIS ISSUE

The Aug. 1990 *OTB* (Vol. 31 No. 2) had a special theme of "restoration." It seems like time for another special on this always popular topic, so this issue contains a cluster of restoration-based articles and columns in addition to regular material.

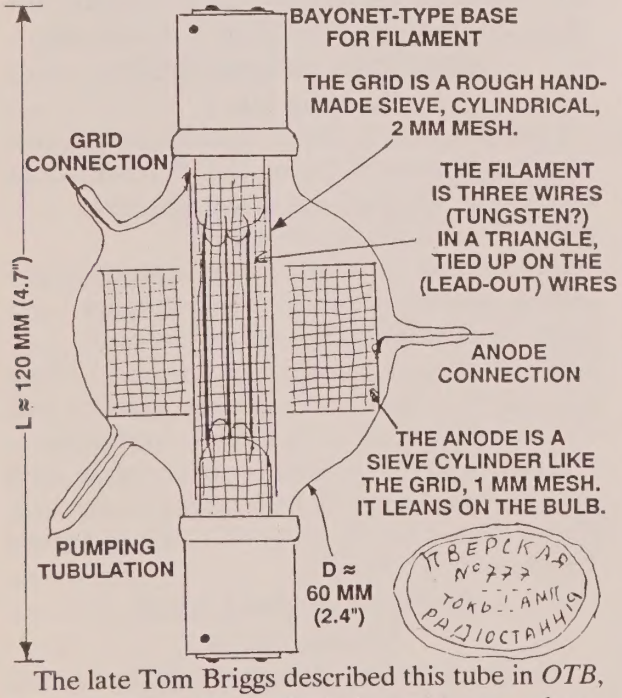
MUSEUM BOOK SALE

A recent inventory of the Association's library revealed duplicate ARRL Handbooks, amateur callbooks, and early *QST*s dating from 1920. They are available to members on a bid-and-sale basis. Send an SASE for a listing to Dexter Deeley, 8 Briar Circle, Rochester, NY 14618. Also available from him: a few copies of Tom Lewis' Empire of the Air at a discount price: $20 plus $1 shipping.

THE COVER

The tube pictured is a Russian item on display in the Musée du Conservatoire National des Arts et Métiers (Museum of the National Conservatory of Arts and Trades) in Paris. Organized in 1794 during the French Revolution, CNAM is the French equivalent of the Smithsonian.

The tube is a hand-made battery triode, made ca. 1916 just before another important revolution. It has European double-contact lamp bases for the filament leads, with flying leads (long since broken off) for grid and plate connections. The label translates as TVERSK RADIO STATION/No. 777/ CURRENT 1 AMP, the numerals being hand-written.


BAYONET-TYPE BASE FOR FILAMENT
THE GRID IS A ROUGH HAND-MADE SIEVE, CYLINDRICAL, 2 MM MESH.
GRID CONNECTION
THE FILAMENT IS THREE WIRES (TUNGSTEN?) IN A TRIANGLE, TIED UP ON THE (LEAD-OUT) WIRES
ANODE CONNECTION
THE ANODE IS A SIEVE CYLINDER LIKE THE GRID, 1 MM MESH. IT LEANS ON THE BULB.
L ≈ 120 MM (4.7")
PUMPING TUBULATION
D ≈ 60 MM (2.4")
ТВЕРСКАЯ
№777
ТОВ. 1 АМП
РАДИОСТАНЦИЯ

The late Tom Briggs described this tube in *OTB*, Vol. 24. No. 1 (June 1983), but without a photo. The picture is by courtesy of Dr. Robert Champeix, source of Briggs' original material, transmitted by Attila Balaton. All three individuals have been AWA Review authors.

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AWA NEWS

CALENDAR

May 1 - AWA Spring Meet, Bloomfield, NY
May 1 - CHRS meet, Redwood City
May 8 - NVRS show/sale, Portland
May 14 - NJARC meeting, Freehold
May 15 - AWA meet, Tranquility, NJ
May 15 - SCARS quarterly meeting, Torrance
May 15 - CHRS picnic, Tilden Park
May 16 - MAARC meeting, Burtonsville, MD
May 16 - British Comm. Fair, Birmingham
May 20-22 - IHRS-AWA Meet, Kokomo
May 21-22 - NARC Radio Daze, Bloomington, MN
June 10-12 - ARCA Convention, Huntington, WV
June 11 - NJARC meeting, Freehold
June 20 - MAARC meeting, Burtonsville, MD
July 9 - NJARC meeting, Freehold
July 16-18 - MARC EXTRAVAGANZA, Lansing
July 18 - MAARC meeting, Burtonsville, MD
Aug. 4-7 - ARCI RADIOFEST, Elgin, IL
August 18 - NFWA meet, Amherst Mus., NY
August 21 - SCARS meet, Torrance
Sept. 22-25 - AWA Conference, Rochester*
Oct. 23 - HARPS Show, Middletown, NY*
Nov. 6 - AWA annual bus. meeting, Rochester
* Full details in August OTB - but see below.

OTB POLICY ON PROMOTING EVENTS

You get the info to us, and we'll advertise it.

For joint club-AWA meetings (with slide shows, etc.), please run the information in through Richard Ransley, the coordinator. For stand-alone club meetings, just get it in to the *OTB* editor - addresses on the inside front cover. Elegant format is not necessary; timeliness is. The News section of the *OTB* is the last to close, about 4-½ weeks before the nominal date of the next issue, except for the November issue, which has to close (sorry!) September 15 because of the Conference.

After-action reports are welcome, for events that have previously been announced in the *OTB*.

RECURRING MEETINGS

Oklahoma Vintage Radio Collectors

Meets the second Saturday of each month (May 15, June 12, July 10), at Gary Dales BBQ, NW 63rd and May Ave. in Oklahoma City. Dinner and socializing starts at 6 PM, meeting at 7. More info: SASE to OKVRC, PO Box 72-1197, Okla. City, OK 73172-1197, or call (405) 722-0595 or (405) 755-4139 eves.

New Jersey Antique Radio Club

Meets the second Friday of each month (May 14, June 11, July 9) at 7:30 PM. Contact: send SASE to Tony Flanagan, 92 Joysan Terrace, Freehold NJ 07728, (908) 462-6638.

California Historical Radio Society

Quarterly swapmeets in the Ampex Corporation parking lot in Redwood City (May 1, Aug. 7, Nov. 6). Gates open at 8:30 AM. Regional events: Picnic at Tilden Park, May 15 (contact: Paul Bourbin, (415) 648-8489); San Luis Obispo swapmeet, June (date to be chosen; contact: Dan Steele, (805) 544-2904); San Francisco swapmeet, July 10 (contact: John Wentzel, (415) 731-1920); Fairfield swapmeet, Sept. 18 (contact: Paul Bourbin); Redding swapmeet, October (date to be chosen; contact Norm Braithwaite, (916) 246-4209). General address is CHRS, PO Box 31659, San Francisco, CA 94131; 24-hour voicemail info: (415) 978-9100). (Info from Mike Adams)

Mid-Atlantic Antique Radio Club

Meets monthly at the New Hope Seventh Day Adventist Church in Burtonsville, MD. Sundays at 2:00 (May 16, June 20, July 18, August 15, Sept. 19), then Saturdays at 6:30 PM (Nov. 20, Dec. 18). Annual Picnic in October. Contact: Lloyd Kendall, (703) 471-6143, or Joe Koester, (301) 725-4229.

Southern California Antique Radio Society

Quarterly flea market and lunch at the Velvet Turtle on Sepulveda Blvd. in Torrance, on the third Saturday of each third month (May 15, Aug. 21). Meeting at the Ramada Inn in Norwalk, Nov. 19-21. Information: Floyd Paul, (818) 242-8961.

NEW YORK SPRING MEET

Saturday, May 1

Local AWA meet, dinner, and sale at the AWA Annex and American Legion Hall, NY 5 & US 20, Bloomfield, NY (2 mi. east of the Museum).

9:00 Flea market, until noon.
10:30 **Auction** of miscellaneous equipment (receivers, speakers, amplifiers, stuff) at Annex.
Noon **Buffet dinner** ($7, incl. auction card).
1:00 **Auction** of members' equipment. Direct sale, seller to buyer, no minimum. Auction card required ($1 at door) to help defray facility cost.

Dinner reservations *must* be made before April 28; reservations cannot be accepted at the door. Phone: Bruce Kelley, (716) 657-7489; or Lauren Peckham, (607) 739-5443.

OREGON SHOW & SALE

Saturday, May 8

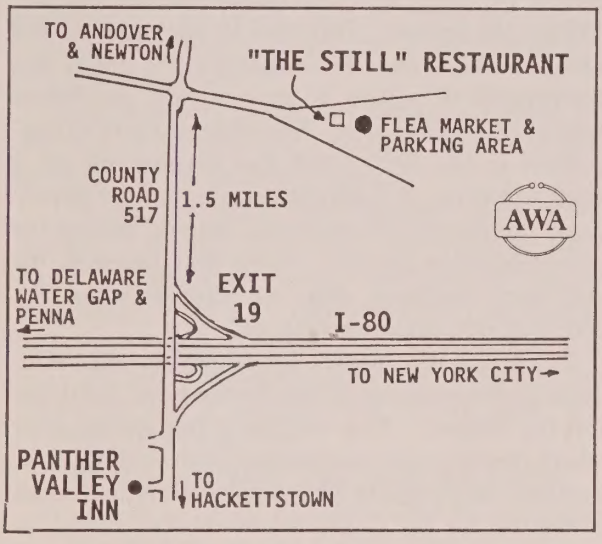
The Northwestern Vintage Radio Society will present its "Back to the Past" show at the Multnomah Arts Center, S. W. Capitol Highway and 32nd St. (in the heart of Multnomah Village), Portland, 9:30 AM - 12:30 PM. This will be the first and largest event of its kind in Portland, four

times larger than any other NVRS-hosted swap-meet/sale. For info and table reservations, contact Sonny Clutter, (503) 254-9296. (SC)

AWA NORTHERN NEW JERSEY MEET

Saturday, May 15

"The Still," Tranquility, NJ, Sussex County Rte. 517, ≈ 1.5 mi. north of exit 19 of I-80 (Allamuchy exit), as last year. Dinner Friday evening; rooms available at the Panther Valley Motor Inn for those staying over. Flea market and luncheon Saturday. Dinner reservations must be made in advance. For details, send an SASE by May 1 to John Richardt, W2WIY, 94 Bald Eagle, Hackettstown, NJ 07840, (908) 852-3475.



BRITISH NAT'L VINTAGE COMM. FAIR

Sunday, May 16

200+ tables of swapmeet material, at the NEC, Birmingham, England. Tables booking at £25. For a booking form/details, contact (speedily) Jonathan Hill, NVCF93, 2-4 Brook St., Bampton, Devon EX16 9LY, England, (0938) 331512. (JH)

MINNESOTA MEET

Fri.-Sat, May 21-22

Northland Antique Radio Club presents "Radio Daze '93" at the Hotel Seville, 8151 Bridge Road, Bloomington, MN. Highlights: a swapmeet both days, auction Friday evening, contest Saturday morning. This year's program Saturday afternoon features a live re-creation of three old radio programs staged by the Rochester (MN) Radio Theatre Guild. Preregistration is $7 for members, $9 for non-members. Registration during the event will be $2 more. For more info write NARC, PO Box 18362, Minneapolis, MN 55418, or call Don Hauff, (612) 374-9739. (NARC)

IHRS-AWA INDIANA MEET

Thursday-Saturday, May 20-22

Ramada Inn, 1709 E. Lincoln Rd., Kokomo, (317) 459-8001. Flea market, equipment contest, restoration and power-supply clinics; banquet Friday with radio-TV star Derwood Kirby as MC; donation and regular auctions Saturday. Programs are being mailed to members in the area. Info: Marilyn/Don Johnston, (317) 945-7735. (MJ)

MICHIGAN "EXTRAVAGANZA '93"

Friday-Sunday, July 16-18

The eighth annual Extravaganza convention will be held in Lansing, MI. However, due to growth of this event, it has been moved to a larger facility, the Holiday Inn South Convention Center. Featured will be an open-air flea market with over 300 sellers' spaces, equipment contest, equipment auction, "informal" social hour with talk and displays related to "Post-WW II Development in Radio Technology and Radio Programming," three programs, women's luncheon, 50/50 raffle, our famous hospitality suite, and much more. For convention brochure or more info, write: Extravaganza '93, PO Box 585, Okemos, MI 48864. (Jim Clark)

ARCI RADIOFEST 1993

Wed.-Sat., Aug. 4-7

The Antique Radio Club of Illinois will present this event at the Holiday Inn, 345 River Rd., Elgin, IL 60123. Call (708) 695-5000 for reservations. Large general auction, contest, special exhibit, donation auction, presentations, hospitality room, awards banquet, Muchow and Motorola Museum tours, open-air flea market each day and more! Info: Jeff Aulik, 1708 Parkview Ave., Rockford, IL 61107; (815) 399-1902 evenings or weekends. (JA)

NFWA/AWA NEW YORK MEET

Saturday, August 14

The Niagara Frontier Wireless Association will hold its annual meet at the Amherst Museum, near Buffalo, NY, 8:30 AM - 3:00 PM, with a large flea market, equipment contest, two auctions, and program on early radio. Contest classes are: • Any radio speaker; • Radio with separate matching amplifier; • AC tube radio; and • Novelty radio (tube or transistor). Auctions will be as last year: a tailgate auction for personal items and a donation auction for items given to support the NFWA. Exhibits will cover rare locally made Federal radios and parts, Federal's station WGR, a 1920s radio-repair bench, etc.

Coffee, soda, and doughnuts will be available. Fee: $2 per person (no extra fee to sell). The museum may be reached from Exit 49 of the NY State Thruway. Take Rte. 78 (Transit Rd.) north nine miles. Just before you enter Niagara County, turn west on Tonawanda Creek Rd. and proceed west two miles to New Rd. (Stay on the south side of Tonawanda Creek in Erie County.) (Larry Babcock)

ARCA CONVENTION

Thurs.-Sat., June 10-12

ARCA will present this year's convention in Huntington, West Virginia, at the Holiday Inn,

Downtown (University area). This will be a major radio event with a large traders' market, seminars, auction (Sat.), ladies' "Collector Corner," Perry's Museum of American History (working museum), and seminars at the Holiday Inn and the Museum of Radio and Technology. New this year: a "homebrew" receiver category in the old-equipment contest. Most points of interest are within 10 minutes of the Holiday Inn. Hotel address: 1415 4th Ave., PO Box 2172, Huntington, WV 25701; (304) 525-7741; fax (304) 525-3508. Rooms: single, $52.50; double, $55. For more info: John Haught, 5268 Webb St., Aliquippa, PA 15001; (412) 378-4026. (Lloyd McIntyre)

AWA CONFERENCE - ROCHESTER

Wednesday-Saturday, Sept. 22-25

Auctions: Communications equipment, Thursday AM. Tubes, Friday AM; then books, literature, and the General Auction.

Technical Programs. Here's a preview:

- Electrical and Wireless Apparatus, pre-1910
- Books and Magazines for the Radio Collector
- History of Collins Radio
- DXing with the Westinghouse RC Receiver
- Amateur Activities Program
- Focused Programs (Telegraph, SWL, Videos)
- "Life of Frank Conrad"
- Equipment Contest ("Westinghouse" theme)
- Radio Collector's Slide Show

Members wishing to participate in the latter should send slides to Lauren Peckham at Box E, Breesport, NY 14816, by September 14. Here's a chance to share your favorite sets or latest find - anything from battery models to transistor sets!

Sightseeing Excursion and Museum Hours: To be announced in August *OTB*.

The Thruway Marriott, near Rochester, NY (in uncongested Henrietta) is a full-sized, full-service hotel, about 15 minutes from downtown or the airport. The flea-market area is paved and lighted. The hotel is reached from Exit 46 of the New York State Thruway (I-90): take I-390 north to NY 253 west, to NY 15 south. The site is 21 easy miles from the Museum at Bloomfield. For visitors arriving by air, there is shuttle service, 7 AM - 11 PM. (Rochester has another Marriott; be sure to ask for the correct shuttle.) The hotel offers special nightly rates ($78 single, $88 double, $90 triple, $100 quad) up to August 23. For hotel info or reservations, call 716-359-1800.

1993 AWA CONFERENCE - FLEA MARKET

In 1992, AWA made several improvements in the flea-market operation at the Annual Conference. Some new ideas worked well, some did not. Learning from that experience, plus taking into account all comments from the membership, the Conference Committee is pleased to announce these plans for 1993.

First, most important, the flea market will run only on the Conference dates from Wednesday morning to Saturday afternoon. Absolutely *no* flea-market sales will take place at the hotel parking lot prior to Wednesday. The flea-market area will be sealed off and unavailable to anyone until the gate opens at 6:00 AM Wednesday. Prohibition of non-conference flea marketing is a matter of hotel rules and our local Special Use Permit required by the Town of Henrietta.

Second, there will be only one class of site: no "premium" or "one-day" sites. All sites are treated the same and are issued randomly on a first-come, first-sold basis. Each member may pre-register for one or two sites, at a cost of $20 for the first and $35 for the second. Two sites to one member will always be adjoining. Pre-registration is highly recommended to assure a pre-assigned, numbered spot on the paved area. Everyone wanting to participate in the 1993 AWA flea market will get a spot. However, it is almost certain that the paved-area, pre-numbered spots will sell out during the pre-registration period. When that happens, we will start assigning spots on the grass on the Thruway side of the parking lot.

Third, the flea-market headquarters will be located at the entrance to the flea market. Look for the big banner. This will be a full-service area where one can pay membership dues and registration fees, and register as a seller. Everyone needs to register for the Conference - the flea market is only a portion of overall Conference activities. A non-member wishing to sell in the flea market may join, paying $12 dues, $13 Conference pre-registration, and $20 for the first site, for a total of $45. (Ed Gable)

BACK ISSUES

The following issues of the *OTB* are in stock and orderable via AWA, 44 E. Main St., Flemington, NJ 08822-1224. Volumes and numbers are:

18-3	20-1	20-3	20-4	21-2	21-3	22-2	22-3
22-4	23-1	23-2	23-3	23-4	24-1	24-2	24-3
24-4	25-3	26-1	26-2	26-3	26-4	27-1	27-2
28-1	28-2	28-3	28-4	29-1	29-2	29-3	29-4
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Prices are $2.50 each postpaid. Comprehensive index to *OTB* Vols. 16-32 and Review Vols. 1-6, free on request with purchase. (LAS)

Several *OTB*s from the past three years have special themes. Each contains the normal columns, etc., but also a core of features on a particular topic area. The number of special-focus pages in each issue is listed below.

40th Anniversary Special ("Best of OTB, 1960-82") (33-2, June 1992) - 48 pp.

Broadcast Receivers (30-4, Feb. 1990) - 12 pp.

Communication Gear (32-1, May 1991) - 18 pp.

International topics and equipment (31-4, Feb. 1991) - 11 pp.
Military equipment in both wars (30-3, November 1989) - 17 pp.
Restoration I (31-2, Aug. 1990) - 20 pp.
Tubes (incl. light bulbs)(31-3, Oct. 1990) - 19 pp.
Wireless equipment/stations (31-1, May 1990) - 15 pp.

AWA REVIEW A-W-A-ILABLE

Volumes 1, 2, 3, 6, and 7 of the AWA Review are available. Contents of all are listed in the November *OTB*, pp 6-7; material in Vol. 7 is also listed in the February issue, p. 46. Price for any volume is $12.50 postpaid (U. S. and Canada; $14 postpaid elsewhere). To order, send a check payable to "Antique Wireless Association" to the Flemington AWA address above.

Many members prefer to combine a Review order with a membership renewal on one check, sending it to the Breesport office.

The vendors below carry various issues of the Review, offering credit-card convenience while one is stocking up on books, tubes, and/or restoration parts. They are: Antique Electronic Supply, 6221 W. Main St., Tempe, AZ 85282, (602) 820-5411, fax (602) 820-4643; and Antique Radio Classified, PO Box 2, Carlisle, MA 01741, (508) 371-0512, fax (508) 371-7129.

NOMINATIONS FOR AWA AWARDS

It is time to nominate candidates for five prizes to be given at the annual Conference.

The **AWA Houck Award** for **documentation** goes to an AWA member who has written several original articles on radio development or history in the *OTB*, Review, or other publication. (This can include a book on a related subject.) The **AWA Houck Award** for **preservation** is for a member who, through personal accomplishment, has acquired and preserved by documenting an outstanding collection of radio artifacts. Send your selection(s) to the awards administrator, giving your reasons why the nominee(s) should receive the Award. The address: John Terrey, Box 2, Carlisle, MA 01741.

The **BK-OTB Award** is given to the member who publishes in the *Old Timer's Bulletin* an article judged to be the most outstanding, original historical presentation of the award year. For this year, articles in the November 1992 and February, May, and August 1993 issues will be considered. All AWA members are eligible for this award except those on the Award Committee and the *OTB* editor. Simply identify the article and the nominee, with reasons for your selection. Nominations should be sent to committee chairman Bill Denk, W3IGU, 81 Steeplechase Rd., Devon, PA 19333.

The **Taylor Award**, in memory of John Taylor, RCA TV developer, is for "preserving television history." Submissions are invited here, too. They may be sent to Ross Smith, 1133 Strong Ave., Elkhart, IN 46514.

The **Tyne Tube Award** is presented, in remembrance of Gerald F. J. Tyne, for contributions to preserving or documenting the history of tube technology. Nominations may be sent, with supporting reasons, to administrator Lauren Peckham, RD 1, Box 676, Breesport, NY 14816-9709.

The November 1992 *OTB* listed award winners over the past 18 years. Please send nominations by August 1 (August 7 for the BK-OTB Award).

AWA SLIDE-TAPE SHOWS ON VHS

The following historical-radio shows produced by the Museum staff are available on VHS videocassette for AWA/local meets (not for other purposes). Also available are the slide shows in carousel trays with audio cassette narration. If your club plans a joint meeting with AWA and would like to borrow a program, contact Richard Ransley, Box 41, Sodus, NY 14551.

V1, "Tour of the AWA Museum"
V2, "Electrons on Parade" - Movie showing tubes being made at the RCA Harrison Plant (1938), ca. 18 min.
V3, "70 Years of Vacuum Tubes" - Development of tubes from the Fleming Valve to miniatures.
V4, "The British Receiver" - Join AWA members in their meet with the BVWS, touring British museums and collections.
V5, "The Early Years" - Documentary showing the early days of amateur radio and the ARRL. Narrated by ARRL founder Clarence Tuska.
V6, "The Key" - The evolution of landline and radio keys, with text by Lou Moreau, W3WRE.
V9, "The 1921 Transatlantic Tests" - A high point in amateur-radio history with station 1BCG.
V15, "WHAM: A Story of a Broadcasting Station." (**New offering** for 1993, with images of this pioneer station from 1922 to the present. Initially available as an 80-image slide show, then a video, to be narrated by Art Kelly, former WHAM general manager, and Bruce Kelley. The video will include sound from 50-year-old NBC-WHAM air checks).

NEW SERVICE AVAILABLE

The "AWA Source Sheet," a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope, to AWA, Box E, Breesport, NY 14816.

AWA AM OPERATION

The Sunday 5-PM AM Net on 3837 kHz saw much activity this past winter, with 18 stations checking in. The AM article in the February *QST* may have spurred interest in "Ancient Modulation." Members' equipment varies from AM-capable SSB sets to modulated oscillators.

Credit for the earliest transmitter goes to Bob Raide, W2ZM, checking in with a 1924 UV-202 Hartley using loop modulation! It is doubtful any-

(Continued on p. 32)

A CLASSIC CATHEDRAL - THE CLARION 85

Bob Haworth, W2PUA
112 Tilford Rd., Somerdale, NJ 08083

In the early 1930s, the Transformer Corporation of America pushed the radio industry into the era popularly dominated by the cathedral-type radio. Thus, before Philco mass-produced their very popular series of cathedrals in the 1930s, the Transformer Corporation had made a series of large units similar to the Model 85.

The Model 85 was sold under the Clarion label. This set, apparently designed in 1931, was of the superheterodyne type with a tube lineup reflecting the times. A Type 51, freshly introduced by Arcturus, provided RF amplification, while a second 51 was used as a first detector, with oscillator injection provided by a 27. Yet another 51 was the IF amplifier, while the second detector and audio were via 24 and PZ/47 tubes respectively. The maker's chassis drawing shows the socket for the output tube stamped "PZ," suggesting that the designer had adopted Arcturus' new pentode early on. Of course, the seemingly ever-present Type 80 handled power-rectification requirements.

Ready to receive the next episode of "Gangbusters."

The 85 had IF transformers about twice the size of prewar 455-kHz IF cans. These massive units supported a 175-kHz IF system and occupied about a quarter of the chassis area.

The set came to me for restoration from a friend who, through family connections in Colorado, had inherited this "diamond in the rough."

The set survived a sojourn of better than 50 years in Colorado, protected by residing in a railroad repair shop area, and no doubt served as a principal source of news to railroaders before and during WW II. The history was traceable, since the owner had been thoughtful enough to mark his address heavily on the rear of the chassis: "B. E. Young, 23rd & Page, c/o C. B. & Q. R. R. Co., Denver, Colo."* He may have thought he was preventing theft, but in reality was providing a link to history.

Restoration of the set was typical for receivers of this vintage, with primary concern centered on capacitor replacement and repair/refinishing of the wood case.

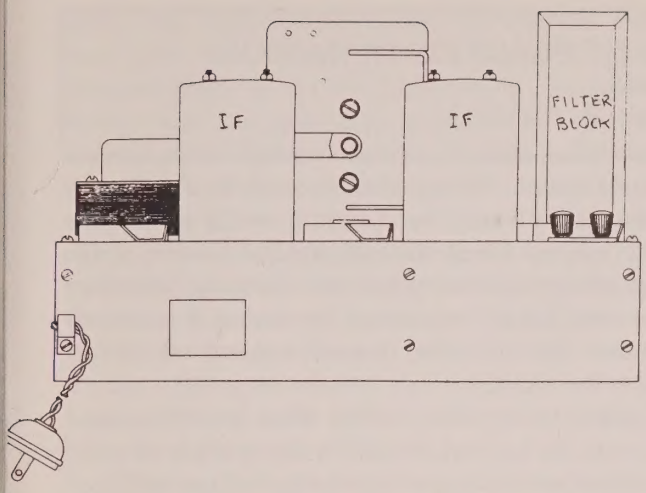
Changing-out of the 2- and 2.5-μF paper filter capacitors was a necessity. These were in a large "filter block" can which, after drilling and prying out the old parts, produced a clean housing for installing new 2-μF paper capacitors. Other capacitors (bypass and coupling) located in three other cans were replaced in a like manner.

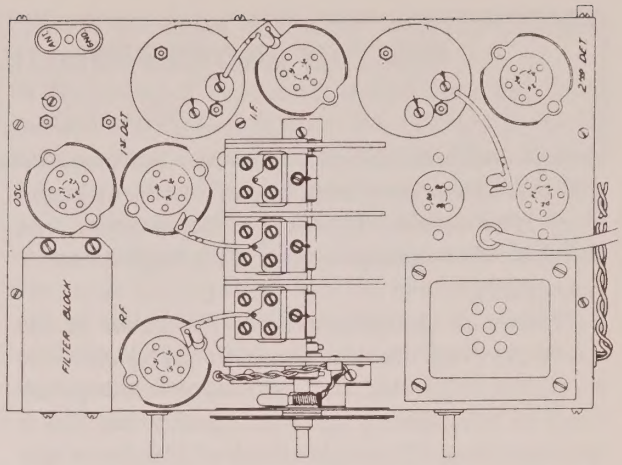
At the time, it appeared that a workable set should result. No such luck: the set was almost mute. It was then diagnosed that the oscillator was not functioning. The oscillator section of the tuning capacitor was shorting over 90% of its travel. A quick movement of a few plates, and the set sprang to life. Dial calibration was almost perfect, proving that the oscillator components had "stayed put" all those years after manufacture.

Reworking the case was more time-consuming. When received, the bottom skirt piece on one side was held to the main body with a 1-½" self-tapping screw, a third of which was protruding, and to be sure it stayed put, it also had a 1-½" headless nail. Veneer was missing from both sides, and the top of the radio looked as if it had contracted the "black death," since it showed heavy black marks characteristic of water damage through a finish.

After regluing the loose parts, installing matching veneer, and plugging with new walnut the various holes left by removal of screws and nails, the cabinet was thoroughly cleaned using mechanic's hand cleaner. Close inspection at this time reveal-

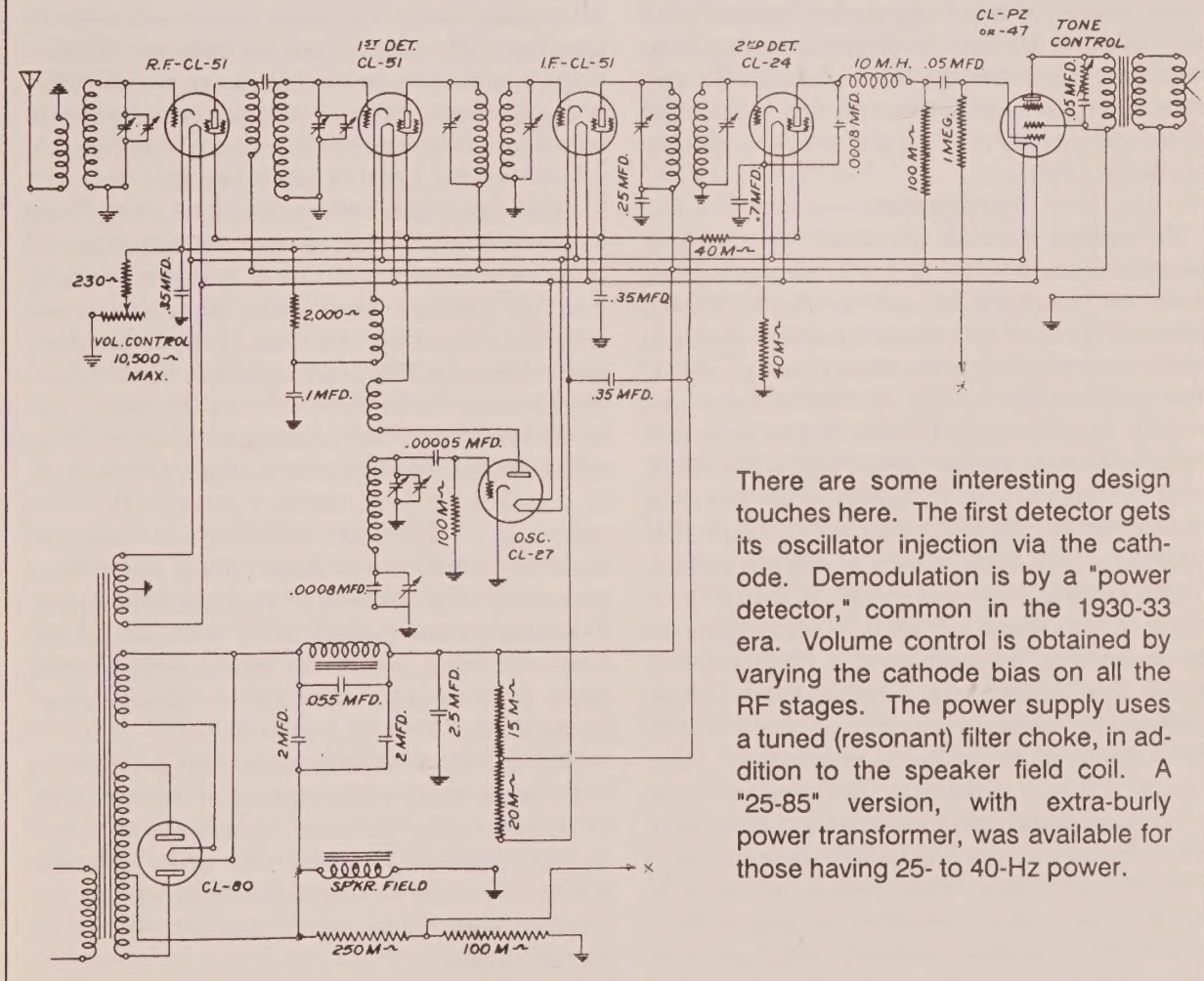
* The Chicago, Burlington, & Quincy main line was indeed built through Denver.





ed that the surfaces had weathered and checked so badly that a reasonable restoration of the original finish could not be achieved. The finish was then stripped, the top surface bleached, and the refinish operation started. A light and a medium walnut stain, application of wood filler, and a complete relacquer of the surface brought back the beautiful two-toning of the cabinet with its highlights in the heavily burled front area.

The only part of the radio that is not original in form, fit, and function is the grille cloth. The original cloth was beyond reuse, so Antique Electronic Supply was called upon to provide a vintage-style cloth that would blend well with the set's finish. It's possible that, somewhere in a Chicago warehouse once used by the Transformer Corporation of America, there exists a bolt of the cloth that was originally used with this model, but I'm afraid I might not live long enough to see it discovered - and the radio couldn't wait that long, so it has been given a new lease on life, and I feel I helped it along the way as time marches on!



There are some interesting design touches here. The first detector gets its oscillator injection via the cathode. Demodulation is by a "power detector," common in the 1930-33 era. Volume control is obtained by varying the cathode bias on all the RF stages. The power supply uses a tuned (resonant) filter choke, in addition to the speaker field coil. A "25-85" version, with extra-burly power transformer, was available for those having 25- to 40-Hz power.

HISTORY AND RESTORATION OF PLASTICS IN RADIOS

D. K. Owens
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Plastics have been used in radio since its beginning. This article will describe the common ones and their characteristics, along with suggestions for restoration.

"Plastic" is the term used by the public to describe anything made of synthetic materials. For many years, "plastic" was associated in the public mind with cheapness and poor quality, but this is no longer true. Engineers think of plastics as materials which melt and can be shaped under heat and pressure. *Chemists* prefer the more specific and all-inclusive term "polymer." A polymer is a giant, thread-like molecule made up of small molecular units joined together like the links in a chain. The units can be all the same or different. Cellulose is a natural polymer made of units of the sugar, glucose, linked together in a long chain. The chains can be many thousands of units long.

Humans have used polymers since they lived in caves. Leather, wool, cotton, ivory, silk, rubber and wood are all natural polymers. These substances all have the drawback that they can be converted into useful shapes only by mechanical means. When complex shapes were needed, natural polymers wouldn't do; clay moldings or metal castings were used. The job of the chemist has been to create materials having the strength and light weight of natural polymers and the cheap and easy formability of clay.

RUBBER

The earliest "plastics" were made by modifying natural materials. The first was natural rubber, which was brought to Europe in 1735 by French explorers. It could be dissolved in turpentine and coated onto cloth to make waterproof garments. These garments got sticky in warm weather and brittle in cold. In 1839, Charles Goodyear discovered that heating natural rubber with sulfur eliminated the undesirable properties while retaining the elasticity and flexibility. He called this process vulcanizing. If a large amount of sulfur was used, the product was hard and tough. Although hard rubber softens when heated, it is not a plastic in the engineering sense because it doesn't soften enough to be molded into complex shapes. Shaped articles are made by vulcanizing the raw materials in the mold under heat and pressure. This material, called "Vulcanite" or "Ebonite," was used for electrical insulators, panels and knobs in early radios. Crosley used it for the UV-type tube sockets in his early sets. Hard rubber appeared in speaker horns in such units as the RCA UZ-1325.

Hard rubber tends to creep or cold-flow under pressure. It is common to see warped panels on early radios. When tubes are left in the Crosley sockets for years, the upward pressure of the contact springs forces the tube against the rim of the socket at the locating pin, and the socket develops an oval shape. Sometimes the socket is so out-of-round that the tube doesn't make good contact with the springs.

Since hard rubber softens when heated, warped panels can be straightened by laying them on a flat surface and shining a heat lamp on them until they soften enough to flatten under their own weight. A Crosley socket can be restored to round by heating in a oven at about 150°F with a hose clamp around it. Gently tighten the clamp to exert pressure on the socket as it softens. Leave it on until the socket is cool. Straightening hard rubber must be done slowly, with the piece uniformly heated; otherwise it may crack or warp again.

Hard rubber is susceptible to surface oxidation, forming a loose, brown layer. The result is a rough or hazy surface lacking the gloss of the original. Such surfaces can be cleaned with automobile rubbing compound and restored to luster with car polish. Luster can be recovered in extreme cases by spraying with a clear lacquer such as "Krylon." Some panels were matte-finish to start with. These can be cleaned with rubbing compound and protected with floor wax, but should not be polished.

CELLULOSE DERIVATIVES

The first plastic which could be melted and molded was also based on natural materials. If cotton was treated with nitric acid, the resulting material, "Pyroxylin," was hard, clear, colorless and infusible. Dissolved in solvent, it made an excellent lacquer. In 1869, in an effort to find a substitute for ivory, it was discovered that Pyroxylin mixed with camphor could be melted and molded into useful articles. Camphor acts as a "plasticizer," i. e., it makes the hard material plastic. This substance, called "Celluloid," was clear and tough and could be colored in any shade. It was widely used for combs, brush handles and ornamental objects. Its explosive flammability made it unsuitable for most radio uses, where the smallest spark could ignite it; however, it was used to make speaker horns like the GGH "Majestic" horn.

Another derivative of cellulose used in radio was cellulose acetate, where cotton is reacted with acetic acid instead of nitric. It is hard and brittle and also requires plasticizers to make it fusible and flexible. Commercialized in 1929, acetate has properties very similar to Celluloid without the extreme fire hazard.

Acetate was used extensively in the 1930s to

make dial escutcheons, knobs, pushbuttons and decorative trim. It was used for the grilles, dial trim and knobs on certain Catalin sets. Being naturally clear and sparkling, acetate was a logical choice for dial "glasses" because it could be molded into complex shapes and was cheaper and easier to shape than glass. Acetate can be colored in any shade. Swirled or wood-grain effects are particularly striking. Because of its tendency to take up moisture, it is not used for parts where insulation is critical. Acetate also was widely used for automobile steering wheels and dashboard trim. It was never used for radio cabinets, to my knowledge, because of poor heat resistance.

Antique-radio buffs know that many acetate dial escutcheons have shrunk, warped and cracked. Many of us remember that those steering wheels did the same thing. The 1937 RCA consoles of the 800-series had large, ornate dial escutcheons, now notorious for warping and shrinking. The problem is with the plasticizers. Being liquids, most have slowly evaporated over the years, allowing the part to become hard and brittle. Between 20% and 30% plasticizer was used, and with the loss of this much volume, severe shrinkage and warping are inevitable. I have seen an acetate slide-rule dial whose length had shrunk from 6" originally to 5-½"! Acetate dial covers will turn permanently yellow over the years from the effects of heat and light.

Unfortunately, all these changes are permanent. I know of no way to restore warped and shrunken acetate parts. Scratches or scuffs can be polished out with plastic polish, but handle old dial covers with care - they are very brittle. Acetate can be glued with any acetone-based cement such as "Duco" to make strong repairs. Use a minimum of glue, and don't let it run onto the surface of the part or permanent marring will result.

In recent times, another derivative of cellulose has been developed. Called butyrate, it is tough and flexible without the use of plasticizers and has much better dimensional stability. Butyrate and mixtures with acetate are still used to make radio and TV knobs.

PHENOLIC PLASTICS

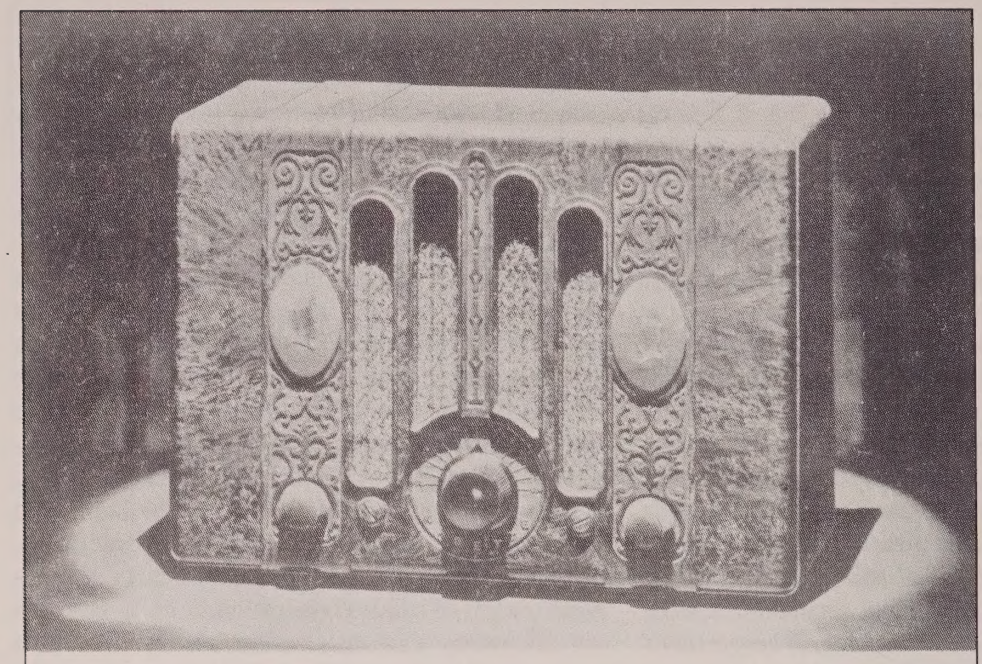
The first truly synthetic polymer, not based on natural materials, was patented in 1909 by Leo Baekeland. It was made by heating phenol and formaldehyde together. It was given the trade name "Bakelite" (Bakelite Corp.) in honor of its inventor. Polymers of this type are a new class of engineering materials. Polymers like Celluloid and acetate belong to the group of plastics known as "thermoplastic." That means they can be repeatedly melted and shaped. Bakelite belongs to the group called "thermosetting," which means that, in the molding process, they become infusible and insoluble in solvents. In the engineering sense, Bakelite is not really a "plastic" because, once formed, the shape of the part cannot be changed except by machining.

The timing of this invention could not have been better. The expanding electrical industry needed a stable, tough, inert material with excellent insulating properties. The commonly used materials like porcelain, soapstone and hard rubber all had deficiencies. The superb insulating properties of Bakelite made it a logical choice for electrical parts. It can be molded into intricate shapes. Its coefficient of thermal expansion is similar to that of metal so that metal inserts can be molded into the part without danger of cracking. Bakelite can be filled with wood flour, mica or asbestos fibers for strength and toughness without hurting the insulating properties. Mica-filled Bakelite can be laminated with cloth to form large panels for radios or switchboards in products called "Micarta" (Westinghouse) or "Formica" (Formica Corp.). Bakelite will not creep and distort like hard rubber. Its heat resistance is phenomenal. Nothing short of a blowtorch will affect it, and it will not support combustion. Bakelite filled with wood flour has a maximum continuous operating temperature of 300 ° F, and asbestos-filled grades are good to 450-500 ° F.

Bakelite quickly found use in radio for panels, terminal strips, knobs, tube sockets and countless other parts. Especially noteworthy is Atwater Kent's extensive use of Bakelite for socket subassemblies, variometers and filament rheostat housings. These A-K moldings are some of the finest examples of Bakelite radio parts. An excellent description of the molding process as practiced in the 1920s is given in Ref. 3.

Wood radio cabinets gave way to metal, but metal was out of fashion by 1930, so it was back to wood. Designers were looking for new, less expensive cabinet materials. Naturally they turned to plastics. The first instance of plastic being used in volume production of radio cabinets was the International "Kadette" of 1932. Because of problems with some early radio cabinets, plastic was not widely accepted by the industry until Sears Roebuck approved its use in 1936. The seal of approval by a major distributor was all the incentive the industry needed. Even so, many major manufacturers were slow to adopt plastic cabinets, fearing that plastic would create the image of poor quality and cheapness. Philco was notably slow to adopt plastic. They offered a few plastic models in 1938 and used plastic trim on their wood "Transitone" series beginning in 1941, but did not offer plastic cabinets extensively until 1946.

Bakelite is a natural choice for radio cases. It costs half as much as wood. It can be molded into intricate and stylish shapes impossible with wood. With its great heat resistance, small AC-DC sets can run quite hot without hurting the cabinet. It takes a high polish. It can be drilled and tapped



International Kadette cabinet, 1933 vintage.

like metal and is absolutely stable without shrinkage or warping. It is inert, unaffected by any household chemical which may be spilled on it. The only real drawback to Bakelite is its brittleness: if you drop the radio, the case may break.

Bakelite articles are molded under heat and pressure from a paste or powder of the partially cured starting materials. Great pressure is needed to force the powder into all parts of the mold cavity. The heat completes the curing reaction, making the material hard and inert.

Bakelite is naturally dark in color and opaque. Although colors are possible with large amounts of pigment, they are dull and muddy. For this reason the vast majority of Bakelite radio cabinets are brown or black. If the pigments are not uniformly mixed with the starting materials, a swirled or wood-grain effect can be achieved, but is rarely convincing. Many manufacturers who wanted bright colors simply painted their cabinets.

The restoration of Bakelite cabinets is straightforward. As with hard rubber, the surface is subject to degradation, but less so. Luster can be restored with polishing compound and wax. Scratches are difficult to remove. In extreme cases, the cabinet can be sprayed with "Krylon" to restore luster. Bakelite can be cleaned with any solvent, including paint remover, without damaging it. Chipped painted cabinets can be stripped and repainted. Cracked or broken parts are difficult to glue. I have never found a really satisfactory adhesive that would give a strong, permanent repair; however, epoxies seem to be the best.

AMINO PLASTICS

A plastic similar to Bakelite, but made of urea and formaldehyde, was invented in 1918 and commercialized in 1928. Called "Plaskon" and "Beetle" (Allied Chemical), it is processed in the same way as Bakelite and is thermosetting. It is clear and colorless. When filled with wood flour for strength, its lack of color enables bright colors to be obtained with pigments. Marbleized effects are easy to achieve. The "Kadette" cabinet mentioned earlier was made of Plaskon. The properties of Plaskon are very similar to those of Bakelite except for heat stability. Maximum continuous operating temperature is around 170°F. It also tends to crack or develop surface crazing when subjected to wide variations in humidity.

Another amino plastic, developed in 1939 and called "Melmac" (American Cyanamid), was made of melamine and formaldehyde. Its properties are also similar to Bakelite, and it is processed in the same way. It has the color characteristics of Plaskon, but has greater heat and humidity resistance, though not as good as Bakelite. Maximum continuous operating temperature for Melmac is around 220°F. It was used extensively in the 1950s to make the brightly colored cabinets popular then. The lower heat resistance of Melmac and Plaskon often results in discoloration of these cabinets near hot tubes where poor design has not provided enough clearance.

Restoration and repair of Plaskon and Melmac cabinets is the same as for Bakelite. Heat damage cannot be polished out because it proceeds from inside out. By the time it shows at the surface, the entire thickness of the cabinet wall has been degraded.

CATALIN

Catalin (Catalin Corp.) is a very close chemical relative of Bakelite. It has all the properties of Bakelite, good and bad. It comes as a thick, light-yellow syrup instead of a powder like Bakelite. As a result, it is clearer than Bakelite, allowing brighter and more varied colors to be used. The clarity of the base material gives the colors a depth and glow not possible with Bakelite. The forming process is different: the syrup, mixed with the desired colors, is poured into the mold and cured by heat without pressure. This process is called casting instead of molding. Being a liquid, Catalin does not

need pressure to force it into all parts of the mold.

Catalin sets were first produced in the mid-1930s. They were cheap, although they must have been more expensive than Bakelite cabinets because of the large amount of hand labor required on each cabinet and the costs of installing a non-standard molding process. The FADA "Bullet" sold for only $19.95 in 1941. Catalin cabinets were offered by many manufacturers before World War II. After the war, only a few were available, and seem to have disappeared by 1948. Sideli [4] discusses the Catalin process and includes pictures of cabinet manufacture.

The surface of Catalin is more susceptible to degradation with age and exposure to light than Bakelite. The colors can change radically as a result, and many sets are not very attractive today. The original colors can be restored by abrasive cleaning and polishing. Because of the extreme value of these sets and my lack of experience with them, I strongly advise anyone who wants to restore a Catalin cabinet to consult experts before attempting it.

MODERN PLASTICS

The Japanese attack on Pearl Harbor in 1941 cut off America's supply of natural rubber from the Far East. A major project was started to develop a synthetic rubber. One billion dollars went into the project. From this effort came not only synthetic rubber, but a host of other polymers which are widely used today. The most common one in radio is based on polystyrene.

Pure polystyrene is a hard, colorless, brittle, transparent material which is used to make small boxes, meter covers and ornamental objects. As a film, it is used as a capacitor dielectric because of its extremely high volume resistivity. Its brittleness makes it unsuitable for radio cabinets. If alloyed with synthetic butadiene rubber in a product known as "ABS," it becomes tough and flexible and has high impact strength. ABS is a family of plastics, not a single substance. Depending on composition, it can range from hard and brittle to rubbery in character. Transistor-radio collectors need to become familiar with ABS because nearly all sets are housed in it.

ABS is thermoplastic and can be melted and molded. It is not transparent like polystyrene, but translucent. It has no color, so it responds well to pigmentation. Bright, sparkling colors are possible in every shade. Wood-grain or marbleized effects are quite striking. ABS is widely used to make the cases for electronic apparatus. Nearly all transistor radios, "boom boxes," cassette recorders, test equipment, etc. are housed in ABS cases. ABS contains no plasticizer and is dimensionally stable, although a poorly controlled molding process can result in internal stresses which give distortion as these stresses work their way out with time. ABS is very tough and flexible and will take a lot of abuse without cracking, but it is somewhat soft and easily scratched.

ABS is an excellent insulator. It is affected by many solvents, which makes it easy to glue with model cement. (Be very careful not to let the cement get on other parts of the cabinet. It will mar the surface.) ABS parts can be cleaned with soap and water, but avoid abrasive cleaners. The only safe solvent for cleaning ABS is rubbing alcohol; any other solvent may attack the part. ABS can be polished with plastic polish to remove scratches and scuffs. Its heat resistance is very poor, and it should not be used for tube-type equipment unless large clearances and good ventilation are provided. It is excellent for solid-state equipment where heat is not a problem. Ordinary ABS is flammable, but flameproof grades have been developed for TV cabinets where high-voltage arcing may cause fire.

Sunlight is extremely damaging to all plastics. Radios should not be placed where the sun can reach them.

IDENTIFYING PLASTICS

Simple tests can be used to identify most of the common radio plastics. You will need acetone and toluene (toluol). Xylene (xylol) may be substituted for toluene. These solvents can be obtained at large paint stores or chemical supply houses.

1. Moisten a finger with acetone and press it to the part where it won't show, because the part will be marred if the test is positive. Acetate, butyrate, ABS and celluloid will become sticky.

2. Moisten a finger with toluene and press the part. Again, don't do this where it will show. Only ABS will become sticky. Confirm if necessary by removing a thin shaving of the part with a razor blade. Hold the shaving to a flame with tweezers. ABS will melt and burn with a very large amount of soot.

3. Identify Celluloid by removing a thin shaving. Hold the shaving with tweezers and touch it to a flame. Celluloid will burn instantly with a flash.

4. Identify hard rubber by burning a shaving and noting the distinctive odor of burning rubber.

5. Bakelite, Plaskon and Melmac do not respond to the solvent tests. Their hardness makes it difficult to remove a shaving and serves to identify them. There is no simple test to distinguish among the three materials, however, for the purposes of restoration, it is not necessary to do so.

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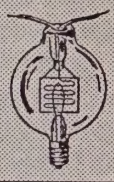
2. Harper, C. A., Handbook of Plastics (New York: McGraw-Hill, 1975).

3. Douglas, A., Radio Manufacturers of the 1920s (Vestal, NY: Vestal Press, 1989), Vol. 2, p. 249.

4. Sideli, J., Classic Plastic Radios (New York: E. P. Dutton, 1990).

THE VACUUM TUBE



EDITED BY
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SPECIAL, PREMIUM, AND LONG-LIFE TUBES

Throughout its history, the tube industry offered tubes based on ordinary commercial designs, but having special performance or reliability. Many of these tubes are still available, but are not used because their characteristics are unfamiliar. Likewise, there is a considerable amount of equipment (commercial, military, mobile, test) where the design called for now-unavailable special tubes but more ordinary types will suffice.

Tubes with special parameters might derive from design refinements or simply from screening tubes in regular production. The tube makers numbered their special-purpose products in several ways.

In the '20s, RCA designated its specials in the 800-series, numbers usually associated with transmitting tubes. For use in broadcast microphone preamplifiers, for example, their low-noise, UX-based version of the WD-11 was the 864; their high-μ preamp variant of the common UX-199 was the 859. Transmitting versions of the UX-210 came out as the 841 and 842.

In the '30s, RCA numbered many of its special variants in the 1600-series. For example, a low-noise, non-microphonic version of the 6C6 was the 1603. Sylvania used the 1200-series: *their* special 6C6 was the 1221. (The 1200- and 1600-series numbers were used for original tube designs also.) Not to be accused of conformity, Ken-Rad's special 6C6 was numbered 7700.

A few specialized variants were designated in the regular receiving-tube numbering plan. For equipment operating from 28-volt aircraft power, RCA's versions of the 12SA7, 12SN7, and 12SR7 came out in 1945-46 as the 12SY7, 12SX7, and 12SW7 respectively. The 12DW7 dual triode was a special combination: half a 12AX7 plus half a 12AU7.

Other improved versions used a simple and obvious letter suffix. Sylvania's improved 6146 transmitting tetrode, intended for consistent output despite the low heater voltage often found in mobile use, was simply the 6146*A*. Octal tubes with bases molded of moisture-resistant material like Micanol were suffixed "Y," as in 6SB7*Y*. "Ruggedized" tubes for military use got a "W" suffix, e. g., 6L6WGB. These mechanical redesigns could be quite radical: one design for the 6L6WGA used two sets of 14C5 elements wired in parallel!

The biggest group of "specials" followed the four-digit numbering system (or *non-system*) beginning with 5500. Many of these high-reliability versions originated ca. 1947 from demands of the airlines. Military requirements called for similar upgrades of regular designs through tighter production control and redesign (often with slightly higher heater current). Usage in aircraft often called for variants with 26.5-V heaters. Instrumentation uses involved closer control of tube characteristics. Vacuum-tube computers had demands for long life, plus retention of cathode activity despite long periods of nonconduction.

The lists below were consolidated from half a dozen manufacturers' data books and catalogs. Types are marked (CM) for commercial/military use, (M) for mobile, (CR) for computer, and (I) for instrumentation, where the reasons for special design are known. Those with higher heater current are marked ($> I_f$).

These are lists of tubes and their predecessors, not of simple dual-numberings. By contrast, many postwar Western Electric designs were dual-numbered into the 5000-series (like the 5847, né 404A) for the general commercial market as made by WECo or others. A great many tubes in this series were dual-numbered into the British military Common Valve (CV) numbering system.

Competition was strong in the industrial-military market. RCA promoted its "Special Red" series (5691-5693) and its "Command" line. GE offered its "Five Star" series, while Amperex promoted a line of "Premium Quality 10,000 Hour" tubes. Sylvania prefixed its high-reliability specials "GB-." The business was quite different from the entertainment-tube market, where everyone made the same types on a low-margin "commodity" basis.

Many redesigned versions look quite different from their prototypes. The common 5U4G, 6L6G, 807, and 6AS7G are in domed "ST" bulbs; their progeny the 5931, 5932, 5933, and 6080 are in tubular "T" shapes. Some "W" versions like the 5R4WGB and 0C3W are on elongated bases such that there is more plastic showing than glass.

From the more popular prototypes, several makers may have each produced versions improved one way or another over a decade ot two. Thus the 6J6 of 1942 led to the 5964 (1950), 5844 (1951), 6045 and 6101 (1953), 6927 (1956), 7244 (1958), and 6099 (1963). As time went on, the less popular or obsolete variants were dropped. (LAS)

PROTOTYPES AND THEIR PROGENY

0A2: 6073, 6626, 6830
0B2: 6074, 6627, 6831
1U4: 5910
2A3: 5930
2C51: 5670, 6185, 6385, 6386
2D21: 5727
2E26: 6893
5U4: 5931
5Y3: 6004, 6087, 6106, 6853
6AB4: 6664
6AC7: 6134
6AF6G: 6355
6AG5: 6186
6AH6: 6485
6AK5: 5591, 5654, 6028, 6096, 6968
6AL5: 5726, 6058, 6097, 6663, 7055
6AM6: 6064, 6516
6AN4: 7738
6AN8: 7258
6AQ5: 6005, 6094, 6095, 6669, 6928
6AR6: 6098, 6384, 7756
6AS6: 5725, 6187, 7752
6AS7: 6080, 6082, 6336, 6394, 6520, 7105
6AT6: 6066
6AU6: 6136, 7543, 8425
6AU8: 7060
6BA6: 5749, 6660
6BE6: 5950, 5915, 7036
6BH6: 6065, 6265, 6661, 7693
6BJ6: 6662, 7694
6BQ5: 7189, 7320
6BW6: 6061
6BZ7: 7057
6CB6: 6676, 7056, 7732
6CH6: 6132
6CL6: 6197, 6677
6CY5: 7167, 7717
6CZ5: 6973
6FW8: 7803
6GE8: 7734
6J4: 7137, 7245, 8532
6J6: 5844, 5964, 6045, 6099, 6101, 6927, 7244
6J7: 6059
6L6: 5881, 5932, 7581
6SK7: 6137
6SL7: 5691, 6113
6SK7: 6137
6SN7: 5692, 6042, 6180
6SU7: 6188
6U8: 6678, 7059, 7731
6V6: 5871, 5992, 7184, 7408
6X4: 5993, 6063, 6202, 6203
6X5: 5838, 5839, 5852
7A6: 5679
12A6: 5659
12AB5: 7061
12AT7: 6060, 6201, 6679, 7728
12AV7: 5965, 6829
12AX7: 5721, 5751, 6057, 6681, 7025, 7058, 7494, 7729
12AU6: 8426
12AU7: 5814, 5963, 6067, 6189, 6680, 7316, 7318, 7730
12AY7: 6072
12BH7: 6913
12BY7: 7054, 7733
12C8: 5660
12SK7: 5661
14GT8: 7724
25B6G: 5824
25L6G: 6046
807: 5933
6146: 6883, 7212

SPECIALS AND THEIR PROTOTYPES

5591: 6AK5 (CM)
5654: 6AK5 (CM)
5659: 12A6
5660: 12C8
5661: 12SK7
5670: 2C51 (CM)
5679: 7A6 (CM)
5691: 6SL7 (> I_f) (CM)
5692: 6SN7 (CM)
5693: 6SJ7 (CM)
5721: 12AX7
5725: 6AS6W (CM)
5726: 6AL5 (CM)
5727: 2D21 (CM)
5731: 955
5749: 6BA6W (CM)
5750: 6BE6 (CM)
5751: 12AX7 (> I_f)
5814: 12AU7 (> I_f) (CM)
5824: 25B6G
5838: 6X5GT (12 V, 0.6 A)
5839: 6X5GT (28 V, 0.285 A)
5844: 6J6 (less I_f) (CR)
5852: 6X5 (1.2 A I_f) (CM)
5871: 6V6GT (M)
5881: 6L6WGB
5910: 1U4
5915: 6BE6 (CR)
5930: 2A3 (CM)
5931: 5U4G (CM)
5932: 6L6G (CM)
5933: 807
5963: 12AU7 (CR)
5964: 6J6 (CR)
5965: 12AV7 (CR)
5992: 6V6GT (CM)
5993: 6X4 (CM)
6004: 5Y3GT
6005: 6AQ5 (CM)
6028: 6AK5 (CM)
6042: 6SN7GT
6045: 6J6 (< I_f) (CM)
6046: 25L6G (CM)
6057: 12AX7 (CM)
6058: 6AL5 (CM)
6059: 6J7
6060: 12AT7 (CM)
6061: 6BW6 (CM)
6062: 5763
6063: 6X4 (CM)
6064: 6AM6
6065: 6BH6
6066: 6AT6 (CM)
6067: 12AU7 (CM)
6072: 12AY7 (> I_f) (CM)
6073: 0A2 (CM)
6074: 0B2 (CM)
6080: 6AS7G (CM)
6082: 6AS7G (26.5-V)
6087: 5Y3GT (CM)
6094: 6AQ5
6095: 6AQ5 (CM)
6096: 6AK5 (CM)
6097: 6AL5 (CM)
6098: 6AR6WA
6099: 6J6
6100: 6C4 (CM)
6101: 6J6 (CM)
6106: 5Y3 (CM)
6113: 6SL7
6132: 6CH6
6134: 6AC7 (CM)
6135: 6C4WA (> I_f) (CM)
6136: 6AU6 (CM)
6137: 6SK7 (CM)
6180: 6SN7 (CM)
6185: 2C51
6186: 6AG5WA
6187: 6AS6 (CM)
6188: 6SU7 (CM)
6189: 12AU7 (CM)
6197: 6CL6 (CR)
6201: 12AT7 (CM)
6202: 6X4WA
6203: 6X4 (rebased; > I_f) (CM)
6265: 6BH6 (CM)
6336: 6AS7G (6 V, 5 A)
6355: 6AF6G
6384: 6AR6 (CM)
6386: 2C51 (> I_f) (CM)
6394: 6AS7G (26.5 V, 1.3 A)
6485: 6AH6 (CM)
6516: 6AM6
6520: 6AS7G (CM)
6626: 0A2 (CM)
6627: 0B2 (CM)
6660: 6BA6 (M)
6661: 6BH6 (M)
6662: 6BJ6 (M)
6663: 6AL5 (M)
6664: 6AB4 (M)
6669: 6AQ5 (M)
6676: 6CB6 (M)
6677: 6CL6 (M)
6678: 6U8 (M)
6679: 12AT7 (M)
6680: 12AU7 (M)
6681: 12AX7 (M)
6829: 12AV7 (CR)
6830: 0A2
6831: 0B2
6853: 5Y3WGT
6883: 6146 (12-V)
6893: 2E26
6913: 12BH7 (CR)
6927: 6J6
6928: 6AQ5 (< I_f) (CM)
6968: 6AK5 (CM)
6973: 6CZ5
7025: 12AX7
7036: 6BE6 (CM)
7054: 12BY7
7055: 6AL5
7056: 6CB6
7057: 6BZ7
7058: 12AX7
7059: 6U8
7060: 6AU8
7061: 12AB5
7105: 6AS7G
7137: 6J4
7167: 6CY5

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REWELD BROKEN TUBE FILAMENTS

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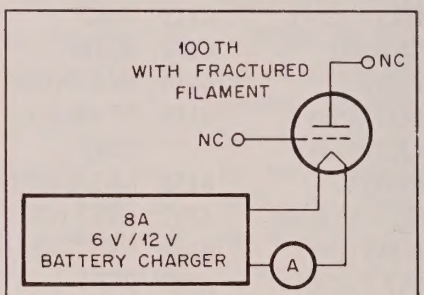
Reprinted with permission from January 1987 *QST*, copyright ARRL.
Thanks to S. E. Watkins, K4OWN, for pointing this item out.

Here is a procedure that can sometimes repair broken vacuum-tube filaments. This technique requires some luck, and not all attempts at repair will be successful. This is the story of one successful repair and one failure.

I had a pair of unused 100TH triodes, which would cost about $200, each, to replace. These tubes, and the larger 250TH, have notoriously fragile filaments. Rough handling or extreme temperatures can fracture or shatter the tube filament. In the latter case, repair is possible only by opening the glass envelope, which is impractical without a laboratory. When the filament is broken in only one place, it may be repairable.

In my case, the two 100THs had been stored all winter in an unheated shack on top of a mountain. When first stored, both tubes were in excellent shape. Spring found both filaments broken at the top, where they are normally welded to the filament support stem.

The vacuum in both tubes appeared good. (A crude check of vacuum in a glass tube is to gently tap it; a tube with good vacuum will ring crisply.) I connected an ohmmeter, set for its highest sensitivity range, across the filament pins of one tube. Next, I tapped the tube envelope at various points with the plastic handle of a light screwdriver. There were several places where tapping on the envelope caused the ohmmeter needle to flick momentarily, indicating that the filament and stem were vibrating into contact. I marked the place where the tapping was most effective with a felt marker.



KI3U's setup for repair of broken tube filaments.

The actual repair was made by connecting an 8-A, 6/12-V battery charger (set for 12 V) and a DC ammeter to the filament pins (see the figure). As I began tapping the tube envelope with the screwdriver handle, bluish-white sparks appeared at the top of the filament. With increased tapping frequency, the filament suddenly lit brightly, drawing more than 8 A. I immediately switched the battery charger to the 6-V position and the current dropped to a steady 5.75 A. After a few seconds, 12 V was again applied for about 1 second, then 6 V with 5.75 A drawn. After 35 minutes, I reversed the charger polarity. (The current had stabilized at 5.6 A.) In reversing the polarity the filament experienced the first shutdown since becoming rewelded. Power was removed after five minutes at reverse polarity. Using a variable AC transformer, I applied power until the filament drew its published current of 6.3 A. At this current, the RMS AC voltage across the filament was 4.0 V. The published voltage is 5.0 V AC (RMS). Nine minutes after applying power, I raised the voltage to 5.0 V. The current read 7.0 A. Three and one-half hours later, I cut all power to the filament for the day.

For the next 30 days, I ran the filament at 6.3 A for 1.5 hours daily to stress-relieve the weld. Each time, the filament drew 6.3 A at 4.0 V and 7.0 A at 5.0 V. At the end of the 30-day period, I measured the interelectrode capacitances. The input capacitance was approximately 0.5 pF higher than the published value of 2.0 pF. The other two capacitances were equal to the published ratings. The emission of the filament was also good. (All instruments used had an accuracy of ±2%.)

An attempt to repair a second tube ended in failure. As before, I began tapping the tube while 12 V was connected to the filament pins. Once again, following considerable internal sparking, the filament suddenly lit brightly. I immediately shut off the battery charger and switched to 6 V. By the time I turned the battery charger back on, the filament had cooled. Now, it did not light; the weld had broken. Repeated repair attempts resulted only in a lot of sparking. Eventually, the glass tube cracked.

The critical difference between the successful weld and the failed attempt was that I did not cut power to the filament, but simply reduced the voltage. The filament was not shut off for at least 35 minutes after the initial lighting in the successful repair. In the second case, I immediately cut the power and allowed the filament to cool. I believe this error caused the failure.

Several questions some to mind about this procedure. Since DC welding requires the correct polarity to be applied between the materials to be joined, it is possible that the polarity was wrong in the second case. (I had not written down the polarities.) Perhaps the rewelding would work better with an AC power source. In any case, I believe it is critical to maintain power after the initial relighting. The new weld must be given sufficient heat to become strong.

Tubes such as the 100TH are still manufactured, although primarily as replacements for older

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RESTORATION TIPS

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Lifted, with connivance of the author, from various recent issues of the Northern Indiana IHRS *News Letter*.

PAINTING A STEEL CHASSIS

Early Philcos, such as Models 20, 70, 81, and 90, usually have rusted chasses and tube-shield units that are all in one piece. Since it is almost impossible to replate these parts, they can be made better looking by applying "steel" color paint from hobby stores. Clean well and prime before applying the final coat. In the shadows of the cabinet interior, you can hardly tell the difference from plating. Do not use silver or chrome paint for this operation.

REPLACING ZENITH DIAL BELTS

Are you having trouble in replacing broken or worn belts from dial drives such as Zenith and others used in the mid-1930s? There are a few new original replacements around but it is getting more difficult to find the length that you need. Here are a few alternatives:

1. Tie two or three turns of medium-weight non-stretching cotton string around the pulleys. Tie each turn individually with a square knot as tightly as possible. Soak the string with a non-slip solution (see below) and allow to dry. (Tension springs cannot be used on the pulley-type dial drives because they would have to circle the pulleys several times from one end of the dial to the other.)

2. Use "O"-rings; most larger hardware stores and industrial supply houses have small-diameter O-rings long enough to stretch around the two pulleys. On a wide flat-surface pulley that has edge rims to keep the belt on the pulley, you may be able to use two O-rings. The advantage is that they will stretch to the length you need and remain under tension.

3. Use urethane belting. The following item appears in Vol. 7, No. 4, Dec. 1978, of the *IHRS Bulletin*, written by Del Barrett of Ft. Wayne. "In restoring black-dial Zenith AC receivers, there is usually a problem with the rubber belt on the tuner and flywheel. I use urethane belting as a replacement for the rubber belt. It is sold in a variety of shapes and sizes (round, flat, thick or thin) and is priced by the foot. All you need to do is cut it to length, heat with a match or a hot knife blade so both ends melt, and then hold the ends together until they cool."

For correcting slippage on any belt, use Radio Shack "non-slip" solution, their catalog number 44-1013. Use a cotton-swab applicator to apply "non-slip" to pulley drive surfaces and to the working surface of the belt. Do not turn until dry.

OTB columnist Rodney Schrock has called our attention to the Zenith belts available from Antique Electronic Supply, P. O. Box 27468, Tempe, AZ 85285. They offer three sizes equivalent to General Cement Nos. 117, 138 and 168, covering 46 chassis numbers. Write or call ([602] 820-5411) for a catalog if you do not have one.

PILOT LAMPS

Having trouble keeping screw- base pilot lights in your AC-DC radios of the early 1930s, the sets with six-volt tubes plus a 25L6 and 25Z5? The pilot light blows when the set is first turned on, due to current inrush from the cold tube heaters. Try a #50 (7.5 volt, 0.22-amp) bulb, available from Radio Shack, in place of the #46 (6.3-volt 0.25-amp) bulb. This idea solved my problem - bulbs get expensive!

Don't throw away a 35Z5 rectifier with heater open between pins 2 and 3 (most of them open here and are OK between pins 3 and 7, which is the primary heater). Pin 2 is the tap for the pilot light. Lamps #40 (screw base) or #47 (bayonet) are used with the 35Z5. In order to use the open-heater rectifier, simply shunt the open section with a 39-Ω 1-watt resistor across socket pins 2 and 3. This is a compromise value to protect from surges. *[Same goes for 35W4s; shunt pins 4 and 6. - Ed.]*

SELECTION GUIDE FOR DIAL LAMPS

No.	Volts	Amps	Base	Bead Color
40	6-8	0.15	Screw	Brown
41	2.5	0.5	Screw	White
42	3.2	0.5*	Screw	Green
43	2.5	0.5	Bayonet	White
44	6-8	0.25	Bayonet	Blue
45	3.2	0.5*	Bayonet	White, green
46	6-8	0.25	Screw	Blue, frosted
47	6-8	0.15	Bayonet	Brown
48	2.0	0.06	Screw	Pink
49	2.0	0.06	Bayonet	Pink
50	6-8	0.2	Screw	White
51	6-8	0.2	Bayonet	White, frosted
55	6-8	0.4	Bayonet	White
57	14	0.24	Bayonet	White

* Some are 0.35 amp.

Radio Shack has Nos. 40, 44, 46, 47, 50 and 53. Antique Electronic Supply has those and the others.

CLEANING PLASTIC CABINETS

The method that has worked best for me on nylon (non-breakable transistor cases) has been to place plastic polish on a soft cotton cloth, then dip the wet spot into dry (powdered) silver polish and rub vigorously. The silver polish has just enough abrasive action to bring out the shine.

'27 REPLACEMENTS

Do you have an AC set from the late 1920s or early 1930s using 227 tubes that are noisy or low in gain? Try changing to type 56 - with 45% more transconductance, it is a better detector and works better as an oscillator or amplifier. Also, it requires only one amp heater current at 2.5 volts instead of 1.75 amps, a 43% saving. I once had to replace a burned-out power transformer in a large console set and could not find a replacement with high enough current capacity for all of the 227s. By replacing them with 56s, a smaller transformer did the trick.

CLEANING TUBES

Did you ever have trouble cleaning the tops of tubes in AC-DC sets, where the glass has been blackened by dust and heat over the years? Try 000 steel wool with a drop of WD-40 and the glass will shine like new. Better not to wash tubes with soap and water: moisture will penetrate the tube base and cause leakage that requires up to 24 hours of oven drying for recovery.

FLAKY MICAS

Information on mica capacitors from Rodney Schrock: "Oscillators are a strange breed. Faced with an inoperative oscillator in a Philco 89, I replaced the mica grid condenser and the set played. I have heard of old variable condenser insulation absorbing moisture and killing the local oscillator, especially in early Philcos. Perhaps drying it with a heat gun or hair dryer, then coating the insulation with clear nail polish, would help. Sometimes an oscillator grid condenser changes value and the tube oscillates over only part of the band. Placing a VTVM on the grid of the oscillator tube verifies this condition. Make sure the oscillator tube has good g_m, check the plate voltage, change the supply resistor, if necessary, to put the plate voltage in the ball park. Check the grid resistor and replace, if necessary. Don't forget to check the heater voltage of the oscillator."

CLEANING GRILLE CLOTH

Have you had trouble cleaning grille cloth? Lee Beyer of Holland, MI, suggested to Doug McIntosh that he use Lestoil for the job. Doug tried it and it worked very well. Doug had tried other soaps and detergents without success. The cloth comes out soft and clean, just like new.

NOISY LOKTAL TUBE SOCKETS

Radios using loktal tubes were produced just before and after WW II. If you are restoring a set with loktals, check them for noise and intermittent operation, as follows:

- With the set operating, rock each tube gently in the socket to check for noise.
- If noisy or intermittent, remove tube and clean all pins with fine sandpaper or #400 polishing paper.
- Spray all socket contacts and center spring with contact cleaner or WD-40.
- Apply vaseline to tube pins and center locking ring.
- If all else fails, try another tube or replace the socket. Loktal tubes have smaller and shorter pins than other types and are more apt to have contact problems due to oxidation. If the tube socket is damaged and the tube will not "lock in," the socket must be changed.

50B5 VS. 50C5 OUTPUT TUBES

When a new series of "All American Five" tubes came out in the small 7-pin size after WW II to replace the octal series of 50L6, 35Z5, etc., the first power tube was the 50B5. For a reason unknown to your editor, the 50B5 was soon replaced by the 50C5 with *some* different socket connections. The plate connection was changed from pin 5 to pin 7. The cathode went from pin 2 to pin 1, and the control grid from pins 1 and 7 to pins 2 and 5. In restoring sets of the late 1940s, it is *very* important to have the correct power tube in the socket. I recently restored an Emerson 547-A that came to me with a 50C5. With no tube chart or schematic, I assumed the tubes that came with the set were correct. *NOT SO*! It was wired for a 50B5 with the plate lead from the output transformer on pin 5 instead of pin 7, which caused an overload on the B+ circuit connected directly to the rectifier cathode. The overload took out part of the rectifier heater and the pilot light with a flash. I burned out two 35W4 rectifiers and two #47 pilot bulbs before discovering the mistake, another expensive lesson!

HAMMERTONE PAINT

George Kasdorf, Sr., W9FSA, of Lewistown, PA, writes "[I am] refinishing a National SW-54 and [believed] that the hammertone finish was no longer available. Some time ago a friend who has a body shop gave me some leftover paint. To digress a bit, all they can't use they have to pay to have hauled away, so all he can give away he doesn't have to pay to dispose of. Anyway I was looking through the paint and came across a can of Pewter Gray. It looked like a close match to the gray hammertone . . . "

THE ELECTRON-RAY TUBE

The electron-ray tube, also called the "eye" tube, was used extensively in the mid-'30s in higher priced radios as a tuning indicator to assist on-center tuning to the frequency of an AM station. Another popular application was in null indicators and leakage detectors in test instruments such as capacitor checkers.

Before development of the eye tube, various tuning meters of the shadowgraph or needle variety were used in top-of-the-line sets, such as Scott, Philco, or Zenith. These were, in essence, voltmeters indicating the swing of the AVC voltage.

Tuning rods were also used in the mid-'30s by Crosley and others.

The tube indicates changes in voltage by a visual indication of changing shadow angle on a small, round fluorescent screen at the end of the glass tube. The target area appears as a ring of green light that varies with the voltage. The extent of the shadow varies between 100°, when the control electrode is negative with respect to the target, to 0°, when the control electrode is at the same potential as the target. Single eye tubes have an internal DC amplifier. Twin indicator types such as the 6AF6G, using two ray-control electrodes on opposite sides of the cathode, require extra DC-amplifier tubes for the driving voltage. Twin tubes provide two symmetric opposite shadow angles by connecting the two ray-control electrodes together, or two unlike patterns may be obtained by individual connection of each ray-control electrode to its respective amplifier. One application for the twin tube is for an FM tuning indicator.

There were numerous types of electron-ray tube. A few American and foreign examples:

2E5	2.5-V version of 6E5
6AB5/6N5	Single indicator type, 6-pin
6AF6/6AD6	Twin indicator, R & L plates, octal
6AL7	Twin indicator, R & L plates, octal GT-size
6BR5/EM80	Single indicator type, 9-pin miniature
6CD7/EM34	Twin indicator, R & L plates, octal
6E5*	Single, sharp cutoff, 6-pin
6FG6/EM84	Single indicator type, 9-pin miniature
6G5/6U5**	Single, remote cutoff, 6-pin
6H5	Dual numbering of 6G5
6HU6/EM87	Single indicator, 9-pin miniature
6M2/EM35	Single indicator like 6CD7; "Maltese Cross" indication; octal
6T5	Single indicator, ring target (rare), 6-pin
UM4	12-V twin, top & bottom
UM80	100-mA single indicator, miniature, German
1629***	12-V octal tubular version of 6E5

* U. S. Army VT-215; Brit. mil. CV51, CV239

** U. S. Army VT-98; British mil. CV504

*** U. S. Army VT-138; British mil. CV1756

The most popular replacement tubes today are the 6E5 and the 6G5/6U5. The 6E5 contains a sharp-cutoff triode which closes the shadow angle on a low value of AVC voltage. The 6G5/6U5 has a remote-cutoff triode which closes the shadow on a larger value of AVC voltage.

Service notes: Some tube sockets for eye tubes are only shells holding six connectors for the tube pins plus a small 1-meg carbon resistor for the series triode plate. When the tube is pulled, the pin connectors fall out of the base shell and wire identification is lost. Also, old rubber wire insulation may fall off, leaving bare wire. It is best to make a sketch of the tube pin connections and colors of the wires in the cable before starting the repair job.

Replacing the missing insulation is a matter of replacing the original cable or insulating each bare wire with a length of spaghetti, both cases requiring removing and resoldering the tube-pin connectors.

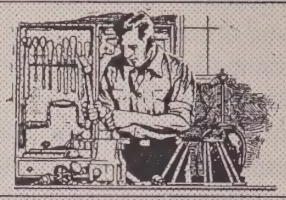
REPLACING BALLAST TUBES

The Depression of the early '30s brought in the era of low-priced AC-DC radios, many with "hot" chasses having one side of the 120-volt line tied directly to the metal chassis. Depending on how the AC plug was turned, the chassis was on either the ground side of the AC line or the "hot" side. There is no record of the number of people who have been electrocuted by these sets, so when you work on them *be sure* to use an isolation transformer in the AC line or plug them in with the ground on the chassis, determined by a neon-bulb test.

This era brought series circuits for the tube heaters in order to eliminate the cost of a power transformer. Tubes available used mostly 6.3 V at 0.3 A, with 25-V power and rectifier tubes. A typical five tube circuit was three 6.3-V and two 25-V tubes, adding up to 68.9 V. The remaining 48.1 V (or more) had to be absorbed by a high-wattage resistor, in the form of either a line-cord resistor included with the the AC line wires, or a ballast tube made in a glass or clear metal envelope with a tube base. Taps were provided at the end of the resistance wire for the 6-8 V 0.3-A pilot lights. There were many variations in the design of ballast tubes, including the ones for battery-operated sets. Probably the most common was the L49B for the typical five-tube set described above. Pin 3 was input and pin 7 output, with the pilot light tap on pin 8.

For replacements, JFD offered the service industry their No. 770 adjustable ballast kit with two each of Types A and B (octals) and one of Type C (4-pin), replacing over 2000 types, all for the price of $5. The metal tubes had aluminum-foil shorting bars with color-coded dots at the bases of the pins. A template and cutter was included which made it easy to adjust, by color code, for the exact resistance needed. A color-code manual listed each ballast number. I used a number of the JFD replacements and found that the ballast absorbed excess voltage; the 25-V tubes were down to 16 volts. An ohmmeter check revealed high-resistance contact between the aluminum foil and the base pin due to oxidation. Shorting out each foil position with a small wire soldered to the base pins brought the tube heaters up to the correct voltage.

EQUIPMENT RESTORATION



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ALIGNING SUPERHETS

For the full word on aligning AM superhet sets, see Ross Smith's article in the Feb. 1992 OTB (Vol. 32 No. 4, pp. 43-45. Here's a supplemental hint.

When I align the IF amplifier with the signal generator coupled into the mixer (first detector) grid, I disable the local oscillator by either placing a small screwdriver blade between the oscillator tuning-capacitor plates to short out the capacitor, thus stopping oscillation, or by connecting a short clip lead between the stator and frame ot the capacitor. Either method causes the oscillator to stop, and the IF can be aligned without spurious responses. (Paul Bohlander, W3VVS)

HIGH VOLTAGE SAFETY AND SPEAKERS

While restoring the "All Star Senior" for the *OTB* article of August 1991, I accidentally rested my left hand on the metal speaker cabinet while reaching for a tube shield on the chassis. I got a terrible shock, which of course, went from one hand to the other, the worst possible condition. I found the primary of the output transformer was leaking to its core, which placed the speaker frame and metal cabinet at B+ potential. A new output transformer cured the problem! (Paul Bohlander, W3VVS)

(Many restorers of cathedral sets and the like, the ones having speaker frames "floating" electrically but with mounting screws going through the front of the cabinet, add a wire grounding the speaker to the chassis. It's not wise to rely on field-coil or transformer insulation that may have been in a damp basement for 40 years.)

REPAIRING CELLULOID

I recently repaired a Burns horn with a black celluloid morning-glory bell which had a crack and a 1" chip out of it. Ordinary glue will not make a strong bond to this plastic (I tried them all), but a crack can be easily repaired by pulling the broken parts together with tape, wire, rubber bands, etc., putting a few drops of acetone in the crack and letting it flow by capillary action, then setting aside the piece for a few hours to dry. Be careful not to get any acetone on the polished surface, as it will dissolve and mar it instantly.

To repair the chipped section, I needed a new piece of black celluloid to glue in place. I tried black plexiglas and it didn't hold. I made my own celluloid sheet by stripping the plastic coating from an old radio transcription (which is the same plastic, that is, cellulose nitrate), dissolving it in acetone to form a lacquer, then pouring out a thin layer of the lacquer on a sheet of plastic and letting it harden. I added more layers of lacquer in the same way until the sheet was thick enough. I cut a matching chip from my new sheet and glued it into place as noted above.

The newly replaced chip had a rough surface, so, after setting it aside a few days to harden, I brought back the smooth high-gloss finish by a sanding process: first, sand the entire surface level with 220-grit waterproof silicon-carbide paper and water with a rubber sanding block. Next, sand with 400-grit paper and then 600-grit. There should be no scratches visible at this point, just a dull sheen. Next, rub the surface with a paste of rottenstone and water on your finger. Finally, a rubbing with Vista car wax brings back the high gloss and the patched section is indistinguishable from the original. (Alan Douglas - *OTB*, Vol. 14, No. 3)

PAPER FOR TELEGRAPH COILS

The electromagnets on telegraph equipment (relays, sounders) are often wrapped with "empire cloth" or a black paper having a ripply texture. To replace a missing wrapping, the modern printing paper termed "linen," sprayed black, makes a fairly close approximation. This paper often appears in material in your junk mail! (LAS)

MAKING DIAL WINDOWS

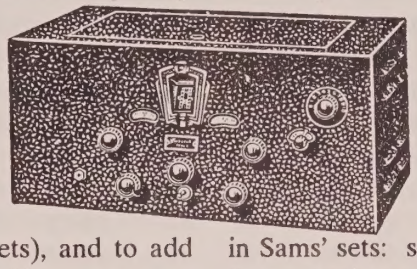
Table radios of 1935-55 vintage routinely turn up with their acetate dial windows torn, scuffed, yellowed, or missing. While plastic polishes like Meguiar's Mirror Glaze are quite effective in removing scuffs and scratches, quite often replacement is required.

The following directions came with an old-time repair kit ("Knapp Radio Products - Acetate Dial Window Assortment"), which provided three pieces of 15-mil plastic:

- Cut piece of wood 1" thick to the shape of your opening, making the wood at least 1/16 of an inch smaller all around than the opening in the cabinet.
- Smooth the wood block carefully and bevel corners with sandpaper block.
- Place sheet of acetate into boiling water with pair of pliers for about ½ to 1 minute.
- Place acetate sheet over opening and press in with formed block. Wooden block should be preheated in oven for best results. (LAS)

A RESTORATION AID, VERSION 2: COMMUNICATION RECEIVERS IN RIDER'S, SAMS', AND SUPREME PUBLICATIONS

This index lists "classic" communication receivers whose repair information is available in Rider's binder series, in Sams' Photofacts, and in the Supreme Publications Most-Often-Needed <year> Radio Diagrams books. The index, originally printed in the May 1991 *OTB*, was developed by merging entries from the publishers' five indexes, with additional cross-checking and refinement. This 1993 version is expanded to add the Supreme listings, to include a few receivers omitted originally (for example, the 1939 Sears Roebuck/RME sets), and to add military designations where applicable.



Receivers cited here were generally intended for commercial operation, amateur use, or serious short-wave listening. They typically have BFOs and bandspread, ruling out "entertainment" sets like the Hallicrafters S-55 or National NC-108.

This material is intended for restoring receivers as well as for general research. If the listed information is unavailable, the index suggests what can be ordered from the reproduction services and Photofact dealers that advertise in old-radio publications.

Listings, if in normal type, are in Rider's binders: volume number first, then page in the section for the particular manufacturer. A Rider's listing with "M" indicates the "miscellaneous" pages at the rear of the binder; "C" denotes "changes" pages. Listings in **bold type** are in Sams' sets: set first, then folder within the set. Some receivers from 1939-52 were covered by two of the three publishers; a few, like the Hallicrafters S-38 or National NC-46, were documented by all three.

Raymond Moore's Communications Receivers - The Vacuum Tube Era, second ed., was a helpful resource in compiling this listing. (LAS)

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THE ADEY PORTABLE 4

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Horace Adey was born in England in 1887 and emigrated to the U. S. at the age of 18. He took American citizenship and worked with the C & C Electric Company as an electrical engineer. The company posted him to Australia, where he married and raised a family: but at the outbreak of World War I he returned to England and resumed British nationality.

He developed an interest in radio and in 1924 set up a company in London specializing in portable sets. One unusual product was his "Cigar Box Portable," which he promoted not only for domestic use but in particular for the Police who were to carry the set strapped to their belts with loudspeakers in the crowns of their English-style tall helmets! Although not adopted by the Police, the proposal generated much valuable publicity for Adey's company.

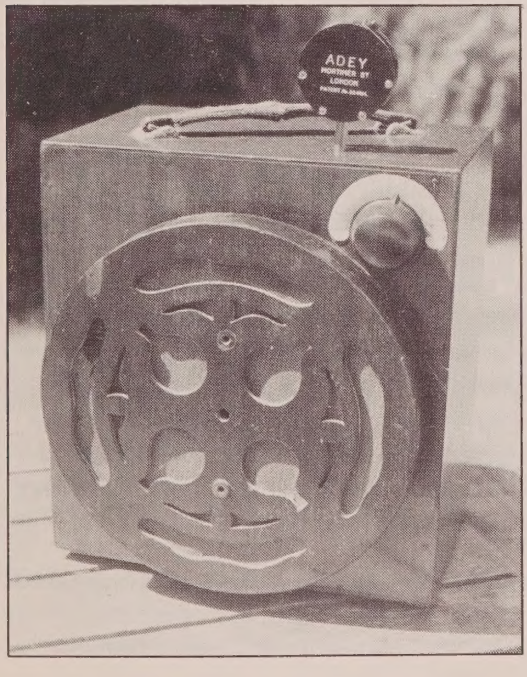
In my collection I have an Adey Portable 4, produced in 1932, which the accompanying circuit diagram shows to be a fairly conventional line-up of two RF stages, leaky-grid detector and output stage. So what's interesting about that? Well, first of all, there is the Adey Self-Coupling Valve, a two-volt filament triode with integral RF choke wound round the bakelite base. The valve has five pins (with European B5 base), with the choke connected between the center pin and the normal anode pin. Three of these valves form a compact arrangement of two choke-coupled RF stages, followed by the detector where the anode choke enables RF regenerative feedback to be derived. The output valve is a conventional power pentode, without integral choke.

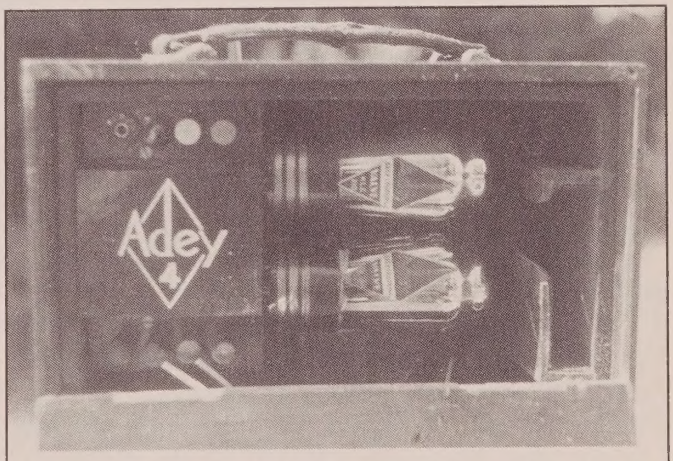
A second unusual feature is the Adey Patent Key. This is an ingenious multi-function control device plugging into a jack socket on the top of the cabinet. The functions controlled are on/off, waveband selection (medium or long), tickler-coil taps, and variable regeneration. All this is achieved by a circular hard-rubber molding containing the tickler coil and a 10-position stud switch, with a jack plug having only two contacts (tip and sleeve).

With the Patent Key removed, the A- and B- battery feeds are disconnected. Inserting the Key to a first click-stop position switches the set on and selects the long-wave band. Pressing the Key down to the second position selects the medium-wave band. Sliding a small knob on top of the Key adjusts the number of tickler coil turns in circuit, and rotating the Key about its vertical axis controls the alignment of the tickler coil with the integral loop antenna and hence the degree of regeneration. The only other control on the set, apart from the Key, is the knob for the variable capacitor tuning the loop antenna.

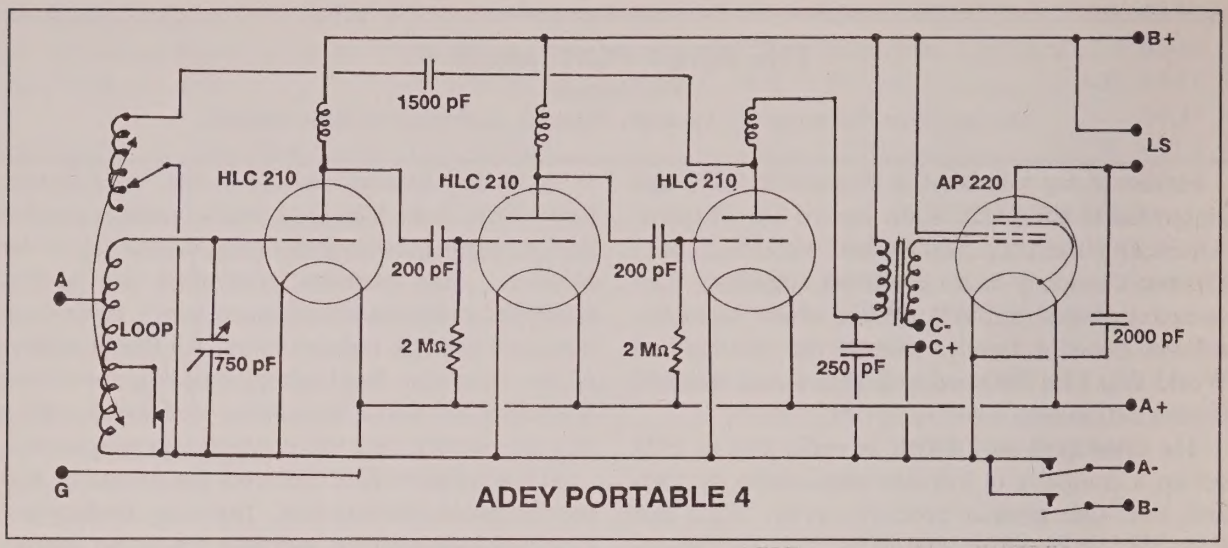
It may not be immediately clear why selectable tappings are needed on the tickler coil. Presumably these are necessary because the gain of the two triode RF stages may vary appreciably with the frequency to which the set is tuned, so that a fixed number of tickler-coil turns could result in too fierce regeneration at one end of the tuning range and too little at the other.

The Adey Portable 4 includes a six-inch cone loudspeaker with "a natural bell-like tone," according to the blurb. Sockets are provided for a phonograph pickup and there is said to be "a suffi-





Left: a front view, with the Patent Key on top. Key is engraved ADEY/MORTIMER ST./LONDON/PATENT NO. 324614. Above: an upper rear view of the set. Tube labels say ADEY/SELF COUPLING/VALVE/HLC 210. Note three-section choke windings on bases of tubes.



ADEY PORTABLE 4

cient volume of sound to fill a large concert hall." The mechanical design of the receiver is good, with the components economically packed but not unduly cramped. Overall size is 9" x 10" x 6-½" and weight with batteries 12-½ lbs. . The cost in 1932 was £7 10s, a bit over $400 in today's money.

Although I'm basically a 1920s man, I was pleased to get this early 1930s set: in any case the circuit technology was very unsophisticated for the 1930s and more akin to that of the earlier decade. But, of course, the real attraction is the unique ingenuity of the special valves and the Patent Key.

MORE ON COLLECTING HEADSETS

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I collect phones - now have 129 different pair. Here are some additional notes to go with the "Ultimate List of Headsets" in the February 1992 *OTB* (Vol. 32 No. 4).

- Davis made phones with black receivers and with very brightly plated receivers. The latter, with raised logo, are especially handsome.
- Newcomb Audio made both 600-Ω and 2K phones. The 600-Ω version were all-black, while the 2K units had red receivers with black caps.
- Brandes made phones in Canada. The receivers are accordingly stamped "Made in Canada."
- Trimm made virtually their entire line - from Acme to Featherweight - in several impedances each. I have measured twin sets up to 5K DC resistance. Trimm Acme 4K sets were made with gray caps on black receivers.
- The Acme, made by Acme Specialty (not Trimm) is one of the highest-resistance sets I have measured, at 5.75K DC.

Many times, cleaning and repair are hampered because caps are virtually "frozen" onto earpieces, due to dirt, grit, or even rust flakes on the threads. A shot of silicone spray will often free them up.

Along with collecting phones, another nice collection can be made of old phone plugs, adapter plugs, multiple plugs, etc. I have several unusual plugs - a few with built-in volume controls, plus specific radio manufacturers' plugs such as those of Freed-Eisemann. Multiple jack boxes, made by Frost and others, extension cords, and tone filters will also add to a phone collection.

Storing the sets in closed plastic bags (tied or stapled) is a must. A 3" x 5" index card, labeled with a bold black marker, placed in the bag makes quick identification easy.

Maurice Sievers' excellent book on crystal sets, Crystal Clear, lists a large number of crystal-set vendors, most of them otherwise obscure, with names familiar from the *OTB* headset list. This includes such names as BASCO, Cannon, Gundlach-Manhattan, Hamburg Bros ("Pennsylvania"), Henry Hyman & Co. ("Bestone"), MESCO, Marinette ("Little Tattler"), John Firth & Co, Murdock, Orator, Pal, Penberthy ("PICO"), Ports ("PRMCO"), Racon ("Coherer"), Radiogem, Spielman ("SECO"), Splitdorf, True Tone, and Wireless Specialty. Presumably this is the result of their selling private-brand headsets with the radios. Obviously, if you have the crystal set today, you need the matching phones!

CATALIN RADIOS - ALL THEY'RE CRACKED UP TO BE

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Throughout the past decade, many of the most sought-after and therefore prized collectible radios have been those generally called "Catalins." This fervor continues virtually unabated today, despite increased availability and generally high prices.

For the many *OTB* readers who are unfamiliar with or disdain this segment of radio collecting, allow me a moment to elucidate what these hunks of collectible plastic (that frequently fetch their weight in gold) really are. "Catalin" has become a generic term for what was once a corporate and trade name. Catalin Corporation was one of several companies that produced a liquid cast phenolic resin from which radio cabinets (and other products) were made. This thick material was poured into lead molds, allowed to harden, and hand-polished to a brilliant luster. Catalin cabinets always required extensive hand work. Most of the holes, surface carvings and grille cutouts were created with tooling after the casting process was complete. This largely accounted for the originally higher list prices of Catalin sets versus their Bakelite equivalents. Nevertheless, these sets were generally less expensive than the cheapest wood-cabinet radios of their time. Trade names of similar plastics include, but are not limited to, Fiberlon, Resinoid, and Marblette.

As I see it, the appeal of these radios is threefold; *Color*, *Texture* and *Design*. Positioned to capture a large share of market and put a radio in every room in the house, the industry turned to *color*. Therefore these sets were produced in a variety of often startling hues and tonal combinations, most of which are still incredibly eye-catching. After all, the most desirable of these sets are typically two-toned. And it is important to realize that most of the cabinets found today are not necessarily indicative of their original factory colors. Ultraviolet radiation from sunlight is believed to be the cause of this unforeseen change. The most common cabinet color, white/alabaster, is often found today in hues ranging from yellow to pumpkin/orange to brown. A variety of greens were produced which may have darkened (faded is the "collectors" term) to a deeper shade of green or to brown or black. Some greens even appear yellow. Reds for some reason seem to have fared the best because they simply darken to a deeper shade of red. Blue, the rarest and most desirable Catalin color, can appear green or black. Many of these "as found" faded examples are, to this collector, far more attractive than the original factory colors.

As for *texture*, what I mean is a thick, deep, usually swirled or marbleized, often translucent appearance that originally (or when polished) acquires a rich, glass-like 3-D finish. One must see a Catalin radio in person to appreciate fully the visual "texture" to which I am referring - neither words nor pictures can properly communicate it.

To explain *design*, allow me to note that these radios embrace the essence of Art Deco - modernistic, streamlined shapes and styles representative of the machine age. Please keep in mind that these sets were produced mainly during the years 1936-48, although some were sold through the early 1950s.

When I first began collecting these radios, some 4-½ years ago, the majority of Catalin sets were selling in a price range of $500 through $1000. The upper limit that I heard of at the time was $5000 for the most desirable sets. A good example is the extremely popular Motorola "S-grille" model 51X15. In today's exaggerated market, top-priced sets command over $10,000, although the more common models sell in the range of $750 to $1500.

Considering collectibles in other fields such as wristwatches, which can easily climb to the tens or hundreds of thousands, or paintings which often rise into the millions, I saw radios as a vastly more reasonable choice.

Of the genre, Catalins were the most attractive to me, and I fell in love with them at first sight while attending a small antiques show in Manhattan. Being a cash-poor grad student at the time, I could afford to buy only two interesting plastic (non-Catalin) radios at the show but I was hooked. And yes, I still continue to collect other types of plastic radios such as those from International Kadette, Detrola, Remler and Air King, to name some of the more popular collectible brands.

I guess my love of highly colored plastics wasn't limited entirely to Catalin products, because in the past two years I also began to collect transistor radios. At least I thought I'd always be able to return home with something after attending a flea market or antiques show. Also the two styles of radios are visually compatible and display well together in various groupings. Unfortunately the price and popularity of the collectible plastic-encased tube sets has apparently sent other collectors in the same direction. This may partially explain the current explosion and frenzy of transistor collecting. But now back to the Catalins.

Like other collectors, I soon found out that Catalin sets were very fragile. This plastic and its clones shrink over time and can crack or chip just

sitting on a shelf or "safely" stored in a box. These extremely brittle radios are easily damaged by just about any physical stress and occasionally (it seems to me) by rapid temperature changes. A friend who collects Zenith consoles once joked that a Catalin collector needs to keep the collection in a large, glass-enclosed humidor to regulate the temperature, humidity, and sunlight in order to protect the sets. I instantly conjured an image of a power failure and the sound of amplified Rice Krispies in milk emanating from this now-defunct radio tomb. We both had a hearty laugh over this. However, I realized that the cracks in these radios might, should or could be viewed as acceptable in many cases. And this is why I wrote the article you're reading.

Cracking is a normal function of the Catalin aging process that I feel should be considered an acceptable defect in many cases. Of course this holds only if the damage does not materially alter the appearance of the set. Furthermore, a perfect or virtually mint example of a Catalin radio was, and continues to be, quite expensive. And remember that no one can predict how long a "mint" set will remain mint. This underscores my more affordable approach to collecting these beautiful radios. I have been able to purchase many attractive sets with minor to moderate damage in the $200 to $300 range. I am often able to buy radios with small chips or hairline cracks (or the less desirable models) for between $300 and $500. Many of the radios, if not for the minor one- to two-inch cracks, could easily fetch a thousand dollars or more. This *is* a significant saving and has provided me an incredibly beautiful and otherwise unobtainable collection. Many of the Catalin "dealer-collectors" I know like to poke fun at those of us who collect slightly to moderately damaged items. And within this group the dozen or so core "dealers" really like to stick it to me. For those who don't know them personally, these are the folks who will "always" pay more than one another for a desired set, if you read their ads in *A. R. C.* They are also the same dealers who will often offer me twice the value of a radio if they need an original knob, bezel or handle to complete an otherwise "perfect" set. And, boy, will they wax poetic when they find themselves with a cracked or chipped set, discoursing on its rarity or desirability or whatever in order to sell it fast. Don't, therefore, let anyone discourage you from collecting these less-than-perfect sets. Many fellow hobbyists, friends, and even journalists have seen my collection (which somehow contains a few "perfect" sets) and always comment positively about it. I enjoy this experience and, best of all, I *can* sleep at night without the worry that a storm will knock out the power and cause my sets to go snap, crackle and pop.

RECREATING A 1938 RECEIVER

Egon Sandell, SM7DO
Oestervernsgatan 8, S-21218 Malmö, Sweden

When I received the February *OTB*, I was touched by David Ivarson's story about his cannibalized two-tube receiver and how he restored it. Our stories are similar.

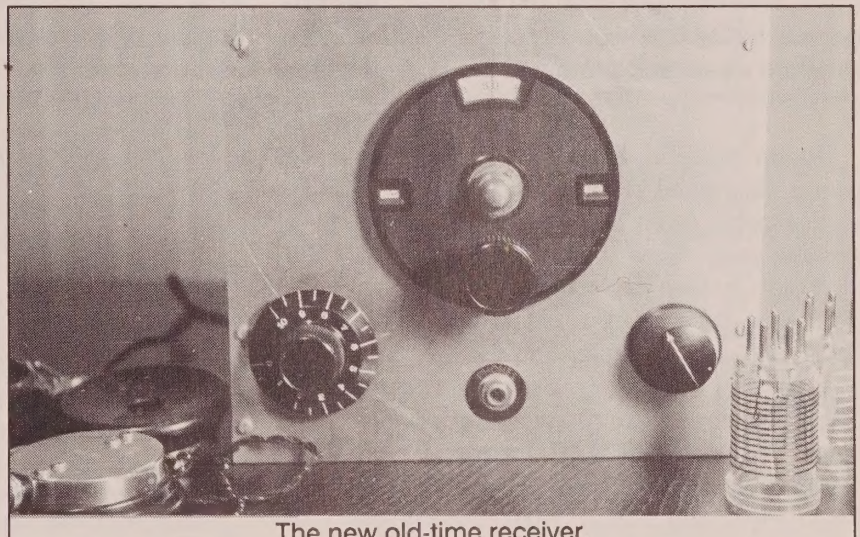
When I entered junior high school, the fellow next to me asked one day if I was interested in building radio receivers. He was referring to crystal sets. Of course, I wasn't - I had never seen a radio. We did not have one in my home and you were not supposed to build radios on your own. It was too complicated and everybody knew that only a genius could construct a machine like that. So it was out of the question for me to think of.

Anyhow, after half a year, we had studied so many books and magazines that we decided to scrap our crystals and get into real business. My pal was a wealthy fellow (or his dad was). When I was thinking of coins, he was talking about bills!

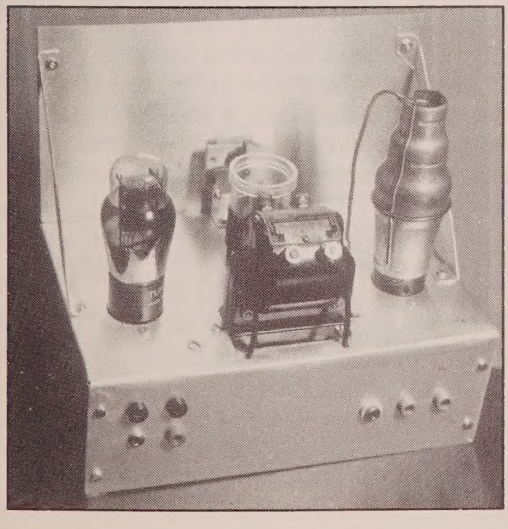
This was 1938 and he bought a Danish radio handbook, the best you could get those days. It contained descriptions and diagrams of all kinds of receivers from one to four tubes, as I remember, all regenerative. My purse could afford only the two-tube version, while he picked the four-tube.

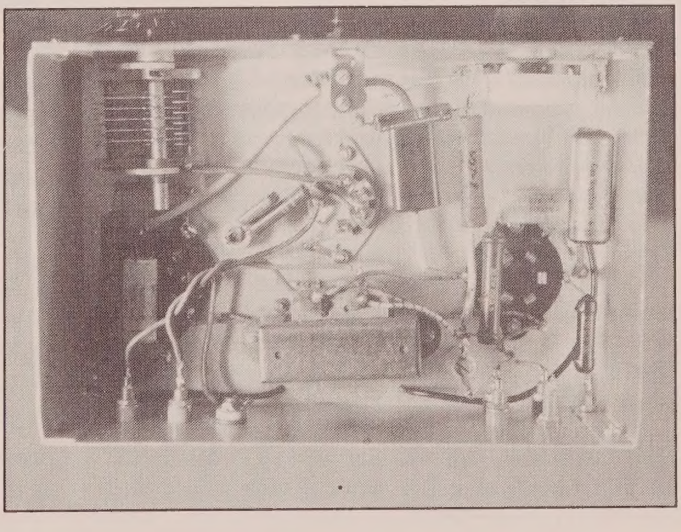
We built our different sets and they worked

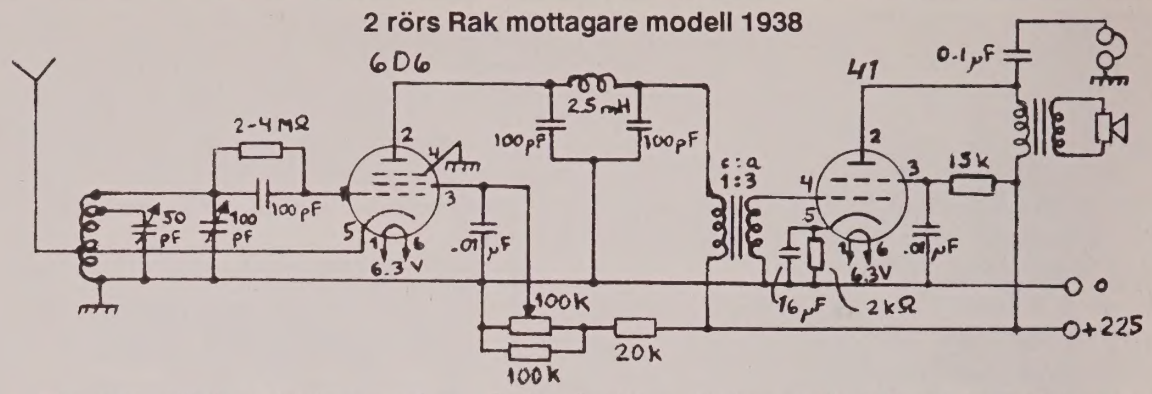
DXing in 1938.



The new old-time receiver.







The reconstituted old-time receiver. Coils: For 80 m, 25 turns with cathode tap at 1 t. and bandspread tap at 14 t. For 40 m, 14 t, tapped at 3/4 t. and 5 t. Diameter, 25 mm.

beautifully from the start. My home was supplied with 110 volts DC, so I needed no batteries. The speaker I used needed a DC field voltage of about 100; a smoothing choke was not necessary. My first DX station received was WRUL, Boston, Massachusetts, and I almost fell off the chair upon hearing the callsign.

This receiver followed me for many years. I added an LF amplifier. I built a preamplifier for it and had a pretty good receiver on getting my ham license in 1947.

I do not remember what happened to this masterpiece, but as I grew older, every time I looked in the photo album and saw my picture with the little receiver, sitting in my room on the second floor searching for rare DX, I wanted to recall the feeling in building and operating an old-time regenerative receiver.

Ever since my first acquaintance with the AWA flea market at Canandaigua, I had thought of collecting old parts and rebuilding the receiver. Then, last September, I bought all the parts needed at the flea market at Rochester. As soon as I came back to SM-land I put the things together and out came a copy of my first tube receiver from 1938. The ham club in Copenhagen has the original 1938 handbook in their files, so I had to go over and check the diagram and coil specifications.

MORE ON THE CRT-2

"Radio Noise by Parachute" (Feb. 1993, p. 48) gave a thumbnail description of the AN/CRT-2 air-droppable radio jammer, based mainly on examining one. Since then, *OTB*/Review contributor Fred Chesson has come up with official information on this set, from Signal Corps TB SIG-5-2C of 1947. In particular, the CRT-2 was not one transmitter, but a family, each covering a specific frequency range. The complete "product line" consisted of the T-94/CRT-2 through T-99/CRT-2, covering bands of 0.95-1.33, 1.36-2.20, 2.0-2.5, 2.4-3.6, 3.5-6.0, and 5.5-7.1 MHz respectively. To quote the manual on one unit in the family, in military jargon:

2C6900-98 TRANSMITTER, radio: Army-Navy Radio Transmitter T-98/CRT-2 (expendable spark type barrage jammer designed to be transported by aircraft in std bomb-racks and dropped near enemy radio installation to disrupt com; rate of descent retarded by parachute which also serves as counterpoise; 90 ft wire ant contained in set; extends itself when launched from aircraft; xmtr is turned on by opening or parachute or at a predetermined time by means of time clock; entire unit is contained in cylindrical cntr 6 7/8" diam x 42 ½" lg; w/batt powered by 16 Sig C Battery BA-37 having oper life of approx 4 hr; produces signal w/ mod characteristic of high incoherency throughout freq band of 3500 to 6000 kc; parachute unit assem same as that used by Ordnance for 23 lb AN-M40 Fragmentation Bomb except dyed olive drab and equipped w/ woven-in counterpoise wire; Sig C Spec #471-3148; p/o Army-Navy Radio Set AN/CRT-2( )). **NX ea.**

In some cases the mission called for stealthy hand-placement of the jammer near the enemy site by intrepid souls dressed in camouflage. For this use, repackaging the CRT-2 yielded the PRT-1 family, one unit of which is described as follows:

2C6900-139 TRANSMITTER, radio: Army-Navy Radio Transmitter T-139/PRT-1 (expendable, portable spark type barrage jammer designed to be deposited near enemy radio installations to disrupt comm; 90 ft wire ant and 90 ft wire counterpoise are mtd on reels attached to unit; xmtr is contained in cylindrical cntr 6.5" diam x 23" lg; unit is provided with shoulder sling for carrying, or 2 units may be mtd on std Quartermaster Pack Board 3 of which are provided w/ 1 complete Army-Navy Radio Set AN/PRT-1(); powered by 16 SigC Battery BA-37 having oper life of approx 4 hr; produces signal w/ mod characteristic of high incoherency throughout freq band of 3600 to 5020 kc). **NX ea.**

Units of this group were the T-135 through T-140/PRT-1, each covering about the same spectrum as the corresponding CRT-2 model.

It will be noted that these models covered the 160-, 80-, and 40-meter amateur bands . . . perhaps it's fortunate that these devices are unavailable today, say, at DX Contest time when competitive pressures rise. There's enough "high incoherency" as it is. (LAS)

THE EARLY HISTORY OF COMPLEMENTARY SYMMETRY

Edward W. Herold
332 Riverside Dr. East, Princeton, NJ 08540-5414

INTRODUCTION

To younger engineers, the connection of opposite-polarity transistors in complementary-mode circuits may seem self-evident. It wasn't always so. To those who came into electronics by way of the electron tube, the idea came as a startling innovation. Suddenly, direct-coupled amplification, as well as push-pull output without a transformer, became the easiest (instead of the most difficult) way to connect one active device with another. In place of more complex electron tubes, the future lay with simple complementary devices combined by easier interconnections, often in the form of the modern integrated circuit. The invention of complementary circuits and the first junction transistors that made possible the early demonstrations make an interesting story which we shall here elaborate, along with some personal reminiscences.

BACKGROUND: THE JUNCTION TRANSISTOR

The possibility of complementary symmetry in devices came from as far back as 1931, when A. H. Wilson [1] explained semiconduction as due to holes and electrons which behaved like opposite charges. By 1938, rectification in PN junctions was predicted by Davydov [2] but semiconductor materials technology lagged far behind theory. It was the re-introduction of the point-contact rectifier for radar use in World War II which provided the stimulus for study of the two elemental semiconductors, germanium and silicon, and ultimately led to the transistor [3]. The first working transistors were of point-contact construction, but the great variability in current gain and the lack of symmetry between N and P types did not make them practical in complementary circuits.

Our story, therefore, depends on the more important device, the bipolar junction transistor. Its invention, in 1948, is one of the most notable events in the history of electronics; fortunately, the story has been carefully and fully documented by the Bell Telephone Laboratories (BTL) inventor, William Shockley [4]. For the world outside of BTL, however, the possibility of the junction-type amplifier was not known until 1949 [5] and the experimental realization in NPN form was not known until 1951 [6, 7]. The same year, John Saby, at the General Electric Co. (GE), described a crude form of PNP junction transistor [8]. However, before the full advantages of complementary circuits could be exploited, much more was required: the availability of quantities of units for circuit experiment and invention.

I was in charge of transistor device work at RCA Laboratories in Princeton, New Jersey, and, in early 1951, our materials research had provided good single-crystal germanium ingots. In June 1951, we learned of the aforesaid BTL and GE junction-transistor work [9]. We had been making single PN junctions by a GE impurity-diffusion process [10] as well as by a BTL grown-junction process [11]. We immediately changed direction to make junction transistors by both approaches.

The BTL NPN units had been made by the grown-junction method. Our attempt to duplicate, by S. Christian and A. R. Moore, moved very slowly and the method seemed very difficult. In contrast, C. W. Mueller and J. I. Pankove, working with indium supposedly diffused into N germanium, were almost immediately successful by the discovery that diffusion was not involved at all. They found that melting a small dot of indium on each side of the germanium wafer led to an alloy of the two elements which, on cooling, re-crystallized into P-type germanium and a low-resistance indium contact. Thus was our PNP alloy transistor born. An important advance was contributed by Pankove and Moore, who found that the collector diameter should be substantially larger than that of the emitter.

By September 1951 the results were so good and the alloy process so simple that we dropped all point-contact transistor work at Princeton to concentrate on the alloy-junction type. (RCA did continue point-contact work at its Harrison, New Jersey, facility and, for several years, made the best amplifiers for the very-high-frequency range.) One objective was to develop a pilot production line so that we could provide junction units to circuit groups, both in our Princeton laboratories and throughout RCA. Another objective was to help RCA licensees, whose royalty payments to RCA supported our work. In that connection, all Bell Telephone patents were part of RCA's patent pool, so no additional license from the Bell System was needed. However, BTL/Western Electric campaigned heavily to license others independently, leading to a rivalry in this fast-moving transistor device and circuit field.

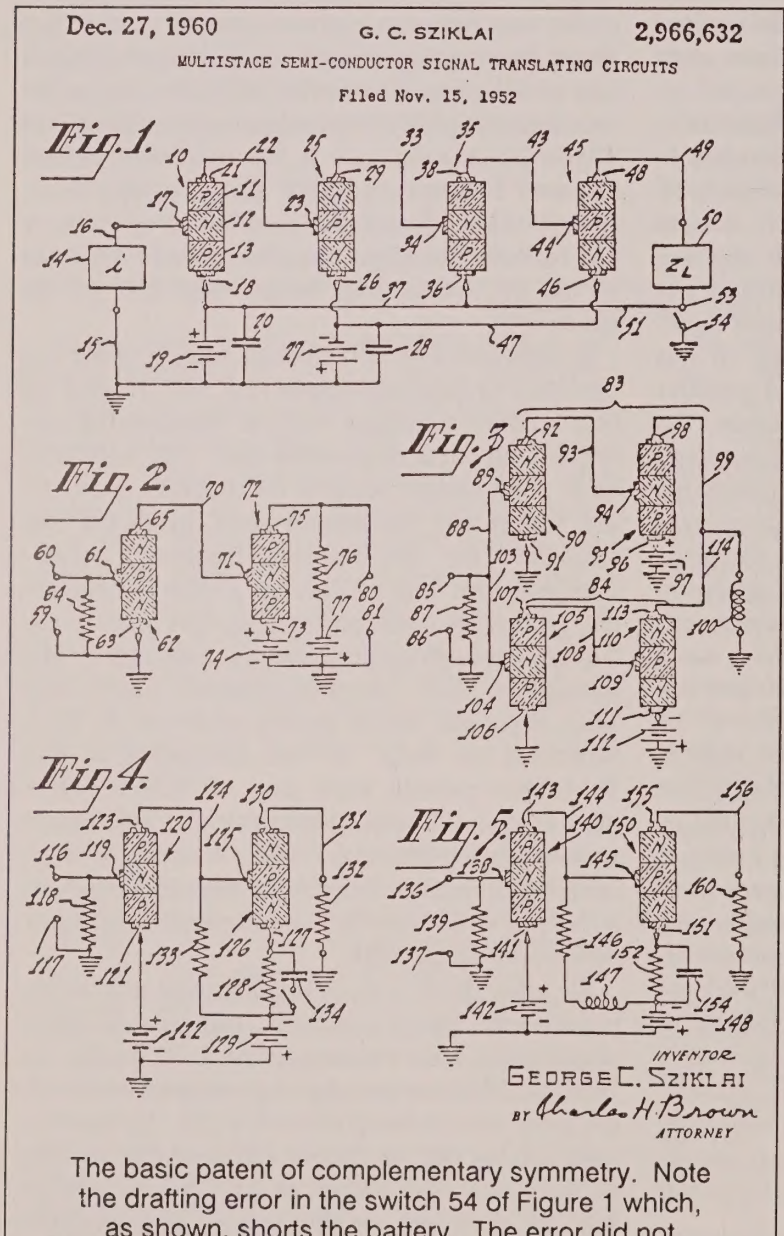
We asked R. R. Law to organize and lead an expanded alloy junction activity, using the facilities of our electron device shop under S. W. Dodge. In January 1952, we started giving out good units with the experimental designation TA-153. By June we were making 400 per month and were also making an NPN alloy type, known as the TA-154. Also in June, we described our alloy process in great detail to RCA licensees [12] and gave a less detailed paper at the June IRE/AIEE research conference,

later published [13]. In contrast to our progress, we learned from outside sources that BTL was producing only 100 per month by their more difficult grown-junction process. GE, whose major interest seemed to be in high-power rectifiers, did not appear to be pushing transistor work vigorously.

COMPLEMENTARY SYMMETRY

As a precursor of future events at RCA Laboratories, one of our device engineers, J. Kurshan, recorded in his notebook for August 1948 a conversation he had with a TV circuit engineer, G. C. Sziklai. This was less than a month after the announcement of the invention of the transistor, and the new device was just beginning to be understood. Kurshan explained to Sziklai that the transistor could be made in either of two polarities and this should be kept in mind in circuit applications. As it turned out, it was Sziklai who was given one of our first alloy junction units and who, immediately afterward, described in his notebook both parallel and cascade combinations of PNP and NPN transistors. From that point on, Sziklai pressed us to provide him with both polarities so he could build complementary circuits. He played a key role in the event I shall describe.

The year 1952 was an exciting one at RCA Laboratories. We quickly realized the advantage we had in having junction devices available in large quantities, and that this could lead to many new applications. Early in the year, RCA's patent-license people proposed that we prepare for a major symposium in the fall to demonstrate how revolutionary the transistor would become. Our circuit people gave us a long list of proposed demonstration projects. Among them, Sziklai proposed building the first all-transistor TV set and also a demonstration of what he called "complementary symmetry" circuits with NPN/PNP combinations. Our expanded junction transistor activity was responsible for providing the junction units and RCA's Harrison facility agreed to provide point-contact units for the highest frequencies where early junction units were deficient.



The basic patent of complementary symmetry. Note the drafting error in the switch 54 of Figure 1 which, as shown, shorts the battery. The error did not interfere with the assertion of the patent.

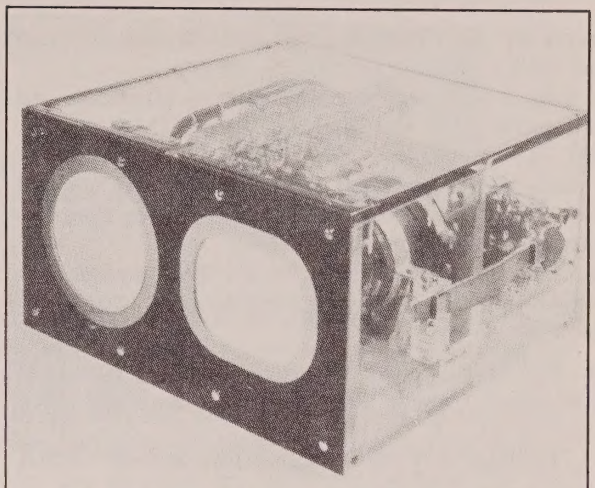
We appreciated the importance of complementary-mode circuits and Sziklai prepared a patent disclosure even before he had his first NPN device. He was joined by two colleagues, G. B. Herzog and R. D. Lohman, and they worked diligently on using the new ideas both in the TV set and in several separate demonstrations. On June 23, 1952, Sziklai gave an internal colloquium talk entitled "The Symmetrical Properties of Transistors and Some of Their Applications" which was in the nature of a progress report. In the meantime, the BTL/Western Elecric group had held their own licensee symposium in April 1952, but there was no hint from them, or from any other company, that the great advantages of complementary circuits had been recognized. It seems possible that we were unique in having devices of both polarities available. Much later, we learned of two related but narrow BTL patent applications filed in September 1951 [14, 15] which did not cover cascade circuits.

Sziklai and his colleagues completed the TV set in October. It used parallel complementary symmetry in the audio output and in the vertical

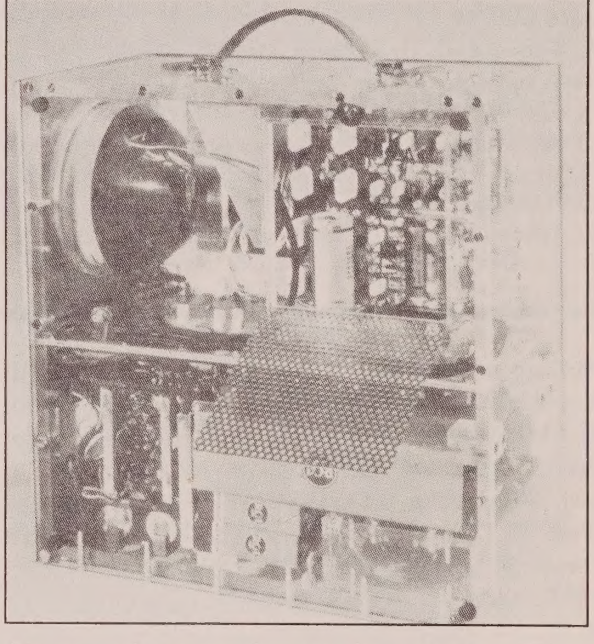
deflection yoke drive, and cascade complementary symmetry in the horizontal pulse amplifier. The only tube in this set was the picture tube, thereby anticipating the all-transistor TV sets that did not appear commercially until 15 years later. Other apparatus using complementary symmetry completed by the Sziklai group were an FM receiver, two versions of a transformerless audio output system directly driving a speaker voice coil, and a transistorized ukelele.

The symposium was a tremendous success. It started November 17, 1952, with a press showing and was followed by nine more days for licensees, government, and in-house personnel. There were some 24 different apparatus demonstrations and a small pilot production line making alloy transistors. The most spectacular exhibits were the TV set [16] and one of the transformerless audio output circuits. The latter used two PNP and two NPN transistors and nothing else, directly into the 16-ohm voice coil of a speaker. It was a historic "first" because, until then, audio output required a transformer, an expensive component.

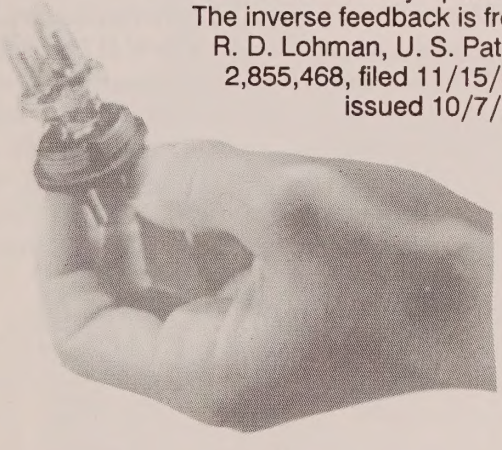
The symposium as a whole was described in an RCA licensee bulletin [17] and in part in an article in *Electronics* [18]. Sziklai's patent application established priority over several others and he was issued a basic patent [19]. Sziklai also published a paper on complementary symmetry [20] and, with his co-workers, another on the transistor TV set [21]. In later years, complementary transistors became a basic tool of circuit designers and spread to integrated circuits and field-effect (CMOS) devices as well.

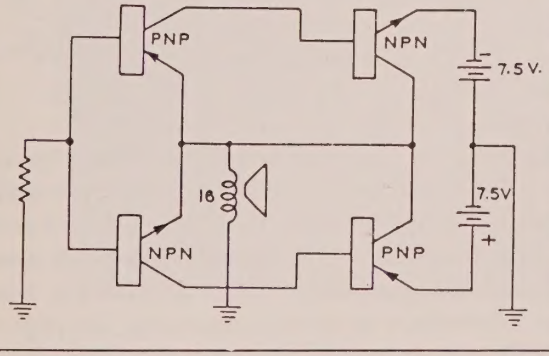


The all-transistor (except for the picture tube) TV receiver using complementary-symmetry circuits. It was demonstrated at the RCA November 1952 symposium.



The four-transistor audio output amplifier that was demonstrated at the RCA 1952 symposium. The inverse feedback is from R. D. Lohman, U. S. Patent 2,855,468, filed 11/15/52, issued 10/7/58.





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BIOGRAPHY OF EDWARD W. HEROLD

Edward W. Herold has had a long career in research and development of electron devices. He joined RCA in 1930 at Harrison, NJ, and advanced to become Director, Electronic Research Laboratory, of RCA Laboratories at Princeton, NJ. From 1959 to 1964, he was Vice President, Research, Varian Associates, but returned to RCA's corporate staff until his retirement in 1972. Herold directed the RCA program which developed the first color picture tube and also RCA's entry into transistors. He is a co-author of the book Color TV Picture Tubes, has published over 50 papers, and holds 47 U. S. patents. He received a B. Sc. from the University of Virginia in 1930, and an M. Sc. and D. Sc. (Hon.) from Polytechnic University in 1942 and 1961 respectively. He is a Fellow of IEEE and has served on the Board of IRE and Wescon. He is a member of Phi Beta Kappa and Sigma Xi and was the 1976 recipient of the IEEE Founders Medal.

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one can predate this accomplishment. His signal was a little tricky to tune in, being a combination of AM and FM. Other early transmitters include the 1936 setup of Bob Decker, AA2CU: a 6L6 osc., 807 buffer, and TZ-40 final modulated by Class B TZ-40s. W2ZM had the most unusual lineup, of late 1920s vintage: 210 osc., 210 driver, 849 linear final. The 210 was Heising-modulated by a 203A with carbon mike and 227 speech amp.

Credit should be given to Chris Bowne, AJ1G, who checks into the Net regularly with unmodified WW II military gear powered by battery-driven dynamotors. The whine of the generator is audible in the background!

Wm. Stokes

For all those who expected to start the flea-market season on March 11 . . .

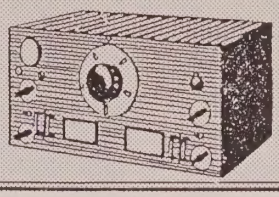
The 5 PM time slot provides excellent propagation for QRP sets. Wayne Green, WA2CJS, has checked in with a one-watt SSB transmitter, while others plan the use of low-power WW II field sets.

The most popular transmitters appear to be such postwar AM rigs as the Johnson Viking. Receivers range from prewar Hallicrafters and Nationals to postwar 75A-4s. Activity will lessen during the summer with the change to Daylight Saving Time. AWA members are invited to join the Net when activity resumes in the fall. (BK)

MEET REPORT: SUCCESS IN NJ

The New Jersey Antique Radio Club held its Spring indoor swapmeet on March 20 at Hightstown. All 35 tables in the building were taken, and 138 collector-buyers and members of the public attended. Vendors were from as far as Schenectady and Harrisburg, buyers from Ohio and North Carolina. The next swapmeet is planned for July. This club, in its first year, has 66 members and publishes a quarterly news bulletin of high quality. Dues are $10 per year. For information on monthly meetings, see page 4. (LAS)

THE COMMUNICATION RECEIVER



EDITED BY
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All correspondence requires SASE for reply

AN EARLY REL AMATEUR RECEIVER: THE 1929 "OLD STANDBY" NO. 192

A manufacturer which started in the early days of radio was the Radio Engineering Laboratories of Long Island City, New York. Their first catalog to be directed at the radio-amateur fraternity was issued in November, 1926, consisting of 44 pages of components and kits, including three two-tube regenerative receiver kits. Of these, the Model No. 130, probably the first REL receiver, was the predecessor of the one featured in this column, the Model No. 192.

While the original circuit, the well-known regenerative detector with one stage of audio, was essentially similar to that of the No. 192, it used a three-section basket-weave plug-in coil mounted on a jack bar, with four coils providing continuous coverage from 12 to 212 meters (1.4-25 MHz). With the new and narrowed amateur bands which became effective in 1929*, REL seized the opportunity to provide an updated receiver by redesigning the No. 130.

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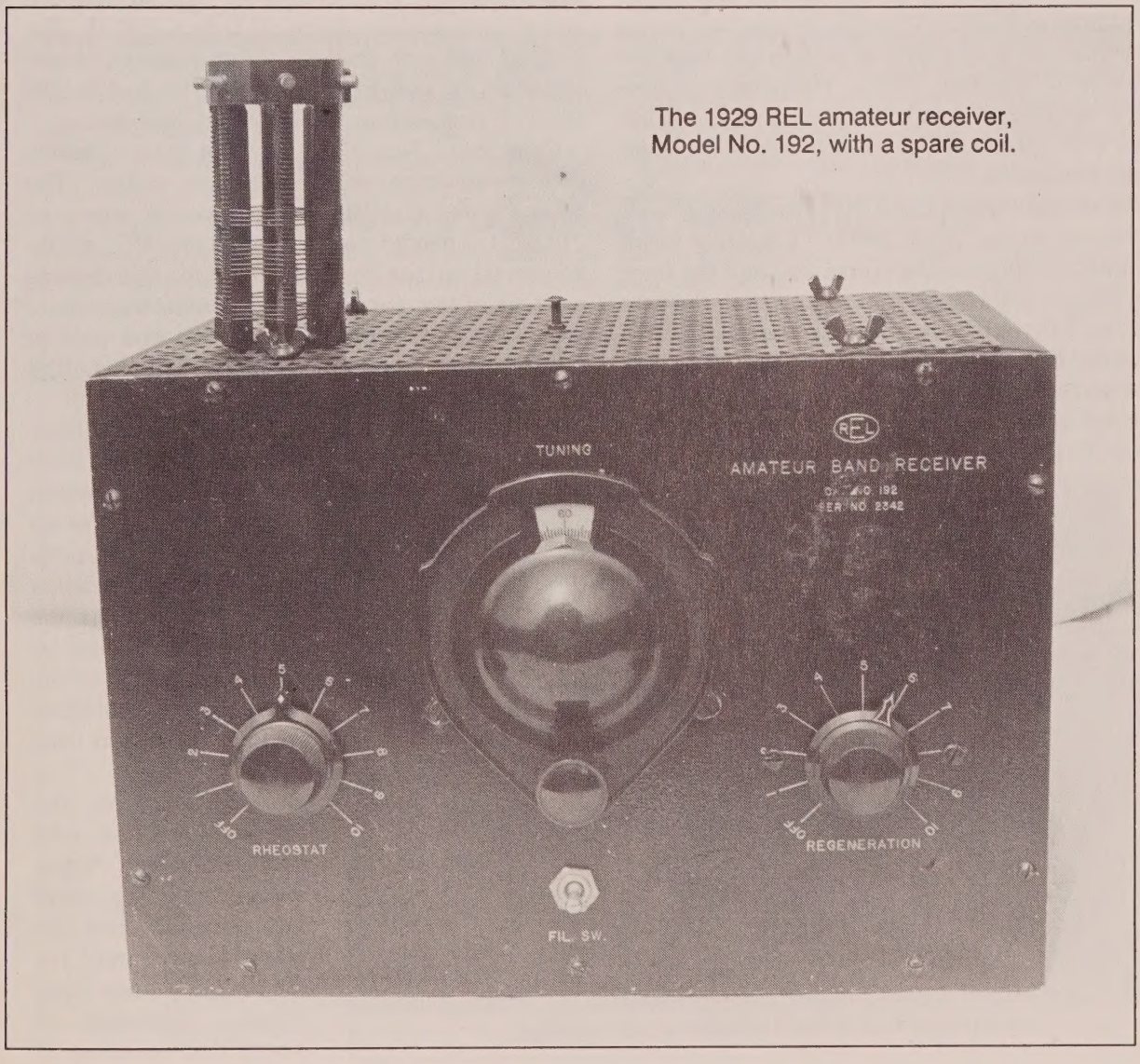
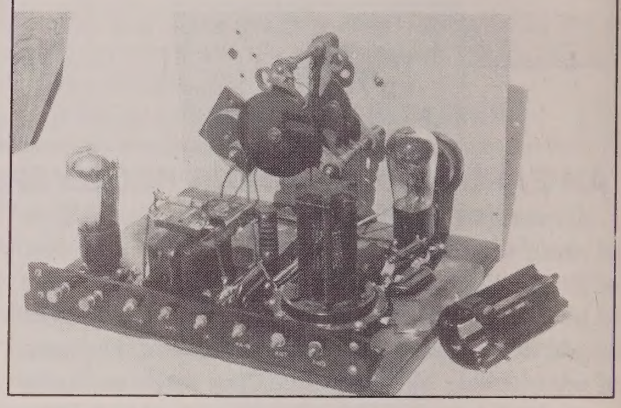
* Under the International Radiotelegraph Conference of 1927 (the WARC of its day), total spectrum allocated to amateur use in the U. S. was reduced appreciably, although greatly widened in most other countries. The bands that emerged were 1.715-2.0, 3.5-4.0, 7.0-7.3, 14.0-14.4, 28.0-30.0, and 56.0-60.0 MHz. The previous U. S. allocations as of 1924 had been 3.5-4.0, ~7.0-7.5, ~13.6-15.0, and 60.0-75.0 MHz. Source: 200 Meters and Down (ARRL, 1936).



The 1929 REL amateur receiver, Model No. 192, with a spare coil.

The REL two-section tuning capacitor and plug-in coils ("For High Frequency Receivers and Low Power Transmitters").



The receiver out of the cabinet. The bakelite band-setting disk and the detent spring on the tuning capacitor are readily visible.

An inspection of the two receivers indicates that REL made substantial and unique changes in the physical layout and key components. The new receiver was totally shielded, enclosed in a steel cabinet with an aluminum front panel. The canemetal top which provided ventilation (as well as a convenient entrance for dirt) was held in place with four wing nuts, giving a relatively easy access for changing bands. A special two-section tuning capacitor and a new style of plug-in coil were announced in October, 1928. With these components the 80-, 40-, and 20-meter amateur bands were each spread across most of the 180 degrees of the tuning dial.

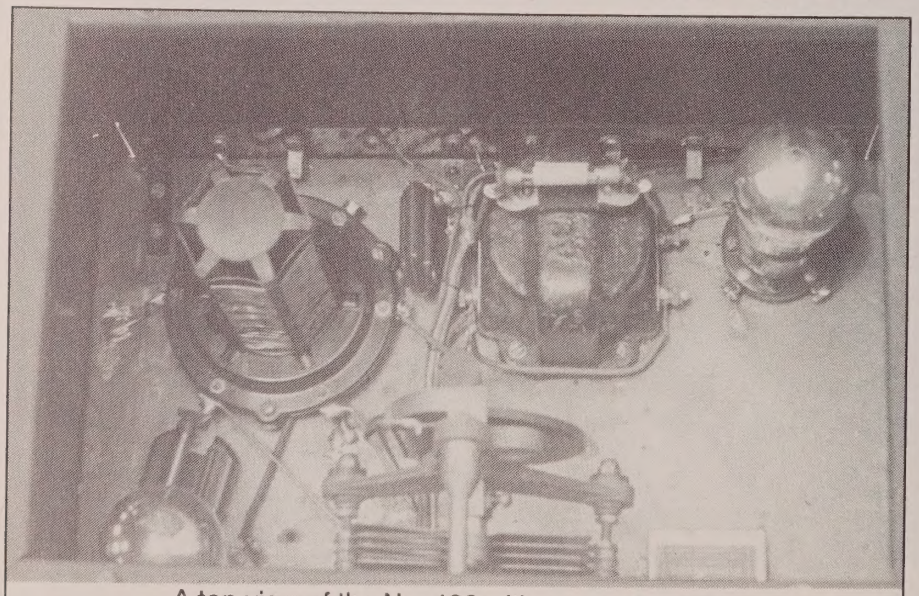
The tuning capacitor and the ribbed plug-in coils are shown in the group photo. Changing bands consisted of plugging the proper coil into the large ring-shaped molded mount and resetting the rear section of the tuning capacitor to the proper spot, as determined by a notch in the bakelite disk mounted on the rear. This position was held firmly by a spring indented into the notch. As was common with REL parts of the day, both the capacitor and the coils were of unique design and were marked with the REL logo.

Specifications for the new components were:

Coils: The three coils for 80-40-20 meters comprised the No. 182 Amateur Band Coil Kit, selling for $10 (1929 dollars.) Forms were of molded bakelite, ribbed and threaded to hold the windings firmly in place. They were fairly large in comparison to contemporary forms, 2" D by 4-1/8" H. The molded base with six large spring contacts, reminiscent of the coil base in the GE-RCA AR-1300 tuner of years before, was 3-3/4" in diameter.

Capacitor: No. 187G. Of wide spaced, heavy-duty construction, with thick brass plates. The main ("tank," in REL's terms) section measured 210 pF, the bandspread section 20 pF. REL claimed several unique design features for this capacitor. One of the more interesting points was the rotor contact; the rotor shaft revolved in a pool of mercury, assuring a positive constant contact. The initial selling price was $6.50.

NOTE: Obviously anyone who decides to disassemble one of these capacitors should be very careful to avoid physical contact with any mercury which may be present. Ample ventilation is also a must, as the mercury fumes can be toxic. Disposing of the mercury is a problem, as it is considered toxic waste.



A top view of the No. 192 with cover removed.

Unfortunately, the frames were cast with the notorious "white metal," with the result that many are now distorted and some are electrically non-functional. However, it seems that not many of

these unique capacitors have survived, and it would be a shame to throw them out. New frames can be fabricated from 1/8" aluminum stock using simple tools, and fitted with a conventional shaft bearing with a contact spring.

The receiver was sold principally in kit form for $40, with all parts except tubes, four pages of assembly instructions, a large photograph of the chassis layout, and a wiring diagram. As noted above, REL attempted to put their stamp on all the parts. The audio transformer had an REL part number, but was actually made by Acme.

The base was a piece of 3/4" plywood covered with a copper sheet in direct contact with, and bonded with a ground strap to, the front panel. The components were mounted directly to the base and the front panel, with both the regeneration control and the filament rheostat insulated from the panel. Interestingly, the assembly instructions emphasized that all RF connections (identified on the diagram) were to be made with heavy copper bus, as short as possible. All soldered joints were to be cleaned with alcohol and then covered with black enamel.

Tubes were UX-201A or equivalent (CX-301A, etc.). The recommended power source was 45 and 90 V "B," and 6 V for the filaments, all from batteries. Battery eliminators could be used, but were not recommended. No "C" battery was needed.

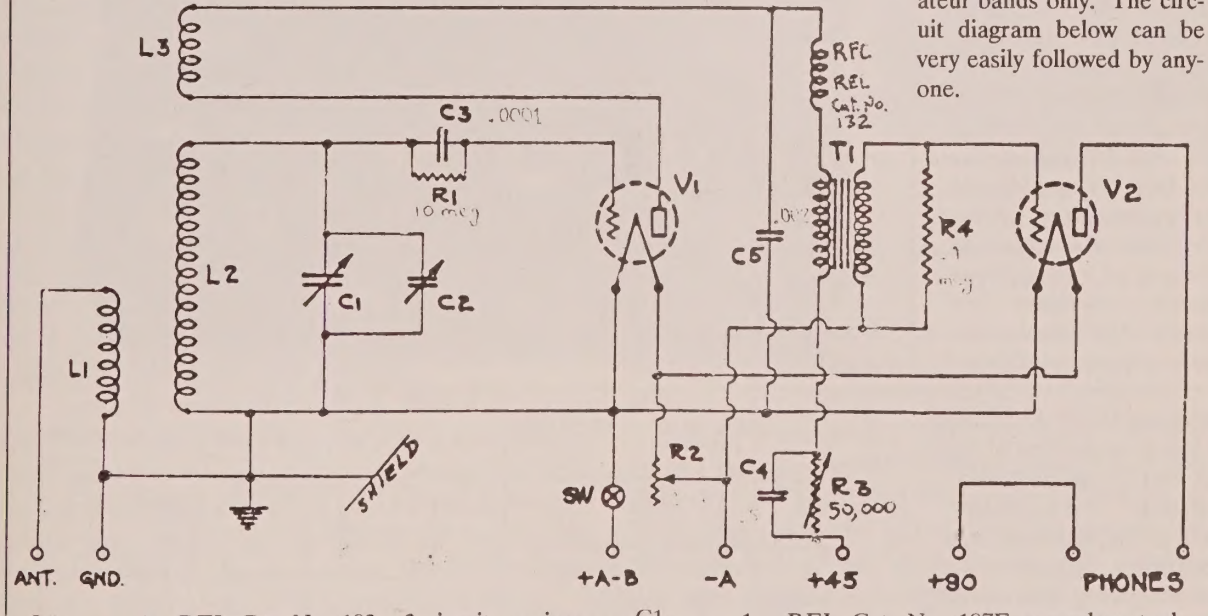
This particular receiver, dubbed "the old standby" by the manufacturer, appears to have had a short market life, and to have served primarily as a market test of the new capacitor and coils. The circuit was already obsolete - newer equipment was being designed and introduced almost daily. Indeed, an elegantly designed coil-capacitor combination is largely wasted in a simple two-tube set, where both the antenna and the regeneration circuit have major uncontrolled influences on the tuning. The 182-187 combination, which was heavily promoted for some time, was used much better in REL's small transmitter kits and such three- and four-tube receivers, starting as soon as February, 1929, as the No. 217. Prices dropped as time went on. The physical format of REL equipment was distinctive, easy to recognize.

Sharp-eyed readers may note that the REL ads (for example, in *QST* for January, 1929, p. 53) showed a pointer with the dial scale engraved directly on the panel, while the set pictured here has a Kurz-Kasch dial. This is not a retrofit; REL did ship receivers with the K-K dial, although the pointer version of the dial was made and sold.

It would be nice to report that the receiver was hooked up to a power supply, an antenna connected, and that signals rolled in from around the world. Alas, such is not yet the case; 60-plus years have taken their toll of the components and the receiver will have to be rebuilt. When this is done, the writer will report the results.

TWO TUBE "OLD STANDBY" AMATEUR BAND RECEIVER

The simplest and most popular short wave receiver for amateur purposes is the old "Standby" Regenerative Detector with one stage audio. The new narrowed amateur bands which become effective in 1929 require revisions to this popular circuit. The main and most desired feature necessary to modernize this receiver is to obtain full spread tuning of each amateur band, that is, the plug-in coils and condenser must be so designed as to tune the amateur bands only. The circuit diagram below can be very easily followed by anyone.



L1-L2-L3 — 1 - REL Cat. No. 182 - 3 circuit receiver coil kit. This kit contains inductances for the 3500, 7000, and 14,000 KC bands and also the base $10.00

C1-C2 — 1 - REL Cat. No. 187E secondary tank variable condenser with special movable vernier for obtaining full scale spread for each band. Max. tank Cap. 115 Mmfd. 6.25

EARLY EQUIPMENT PROFILE

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A MAJOR (ARMSTRONG) PROTOTYPE

The six-tube receiver in the photo has been part of my collection for a number of years. Although I knew it had once belonged to Howard Armstrong, thee history of the set was unknown. After a bit of research, we now have a few answers.

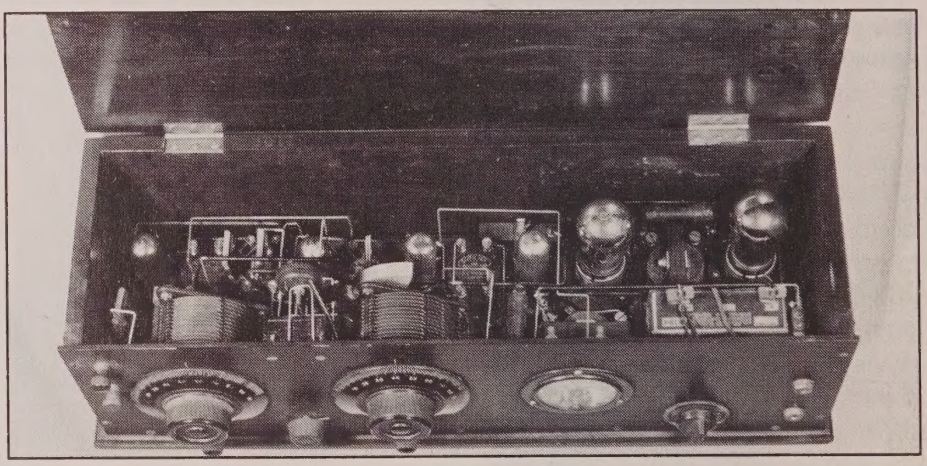
The Radio Club of America published The Legacies of Edwin Howard Armstrong in 1990. A large section is devoted to the superheterodyne, including various circuit configurations.

With the aid of Harry Houck in 1922, efforts to reduce the cost and complexity of the superheterodyne were underway. A change from tubes requiring storage batteries for filament heating became possible with the availability of the WD-11. A short time later a group of demonstration receivers using Harry Houck's second-harmonic principle were constructed. Armstrong described this work in a paper before the Institute of Radio Engineers on March 5, 1924, "The Super-Heterodyne - Its Origin, Development, and Some Recent Improvements" (*Proc. IRE*, Oct. 1924, pp. 539-552, and reprinted in the Armstrong anthology.) His description included the following on a way to reduce the number of tubes:

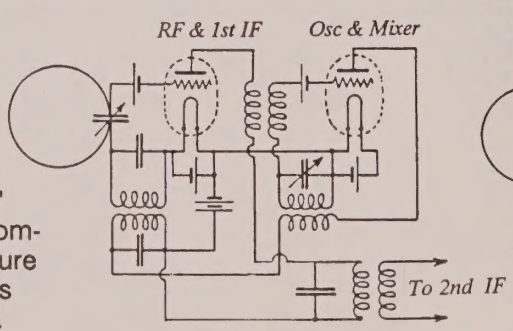
> [T]he radio frequency amplifier can perform the function of amplifying intermediate frequency as well. The general arrangement of circuits is illustrated in [the left figure]. In this arrangement the signals received by the loop are amplified at radio frequency by the first tube and applied to the grid of a second-harmonic oscillator by means of an untuned radio frequency transformer. The combined signalling and heterodyning currents are then rectified by the second tube, producing a current of the intermediate frequency which is applied to the grid of the first tube, amplified therein, and passed on to the second stage of the intermediate amplifier. A more practical method of carrying out this idea is illustrated in [the figure at right].

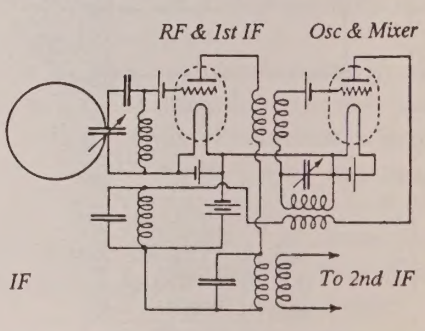
These receivers used the UV-199 tube. The samples I've seen have General Radio variable capacitors, a panel meter, and Dubilier coils for IF stages. All sets had similiar controls mounted on the front panel. None of them included markings regarding the purposes of knobs or dials. This is typical of Armstrong and Houck experimental equipment. Binding posts for connections to "A" and "B" voltage supplies are identified by stampings in a thick brass strip. The two audio tubes are UV-201As in GR Type 156 sockets. A final note of interest: this receiver played a part in one of the numerous patent interferences that were part of Armstrong's life. An official-looking tag still with the set reads "US DISTRICT COURT, ARMSTRONG, defendant's exhibit no. 6-N-14."

Of course, the result of all this development work was the Radiola Superheterodyne, model AR-812.

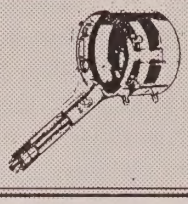


Reflexed RF-IF amplifiers. In the simpler one at right, the first IF coil parallels the loop. The oscillator runs at half the injection frequency, Houck's innovation, giving less "pulling" of its frequency by the incoming signal but more exposure to spurious responses. IFs were low, e. g., 20-50 kHz.





THE TELEVISION RECEIVER



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COLLECTING CRTS AND PICKUP TUBES

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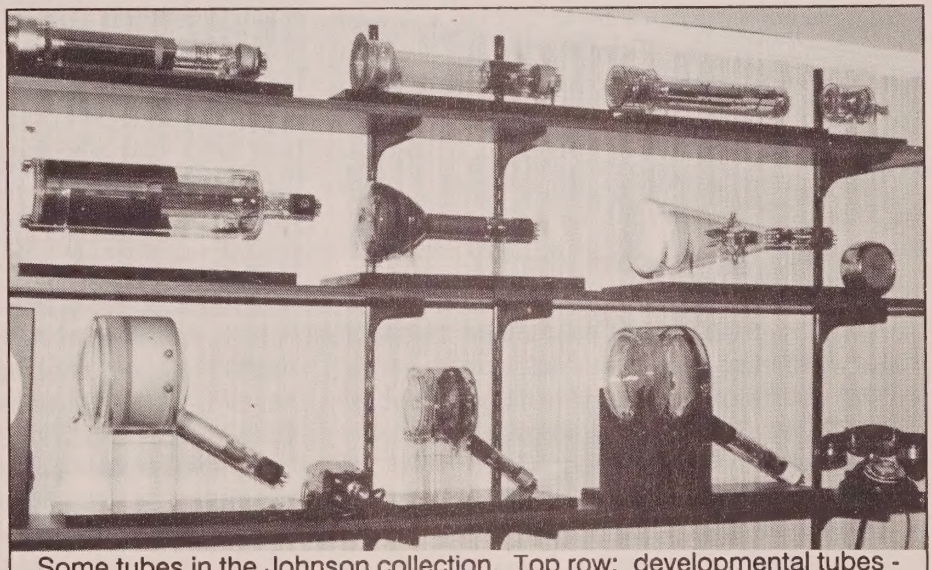
A new aspect of the interest in early television apparatus is the finding and collecting of early (prewar) picture and camera tubes, which were fundamental to the evolution of present-day television transmission and reception.

I have always had a fascination with both the developmental television camera tubes and the better known CRTs in the receivers of the day. As a teenager, I would take the bus to Chicago's "Radio Row," where a cluster of electronics dealers and outlet stores centered around Michigan Avenue and 24th Street.

One Saturday, I came across one of the early iconoscope tubes. I was attracted by its unusual configuration. Having some of the literature on early experimental television, I had a fairly good idea of the origins and function of this unusual tube. Some time after that, at another store on Michigan Avenue, I came across a military iconoscope camera. The price was too high for this 16-year-old's budget, but on every trip back to the store, I headed straight to that camera and kept noticing the price going down. After a few more visits, when it had come into range, I bought it and took it home.



Some tubes in the Johnson collection. Top row: developmental tubes - image orthicon (1945), single-gun color vidicon with stripe target (1955), image isocon, electron-multiplier phototube. Middle row: products by RCA - 1840 orthicon, 2F21 monoscope (Indian-head pattern), 905 CRT. Bottom row: RCA iconoscopes - 1850A, 1846, 1849.

I carefully removed the type 1846 iconoscope (for that's what it was) and put it in a wooden box for protection, while working on getting the camera into operating condition. One never-to-be-forgotten day, I picked up the box by the handle, the latch opened and the iconoscope fell on the floor, breaking it and my heart into a thousand pieces.

All was not lost, because I found the 1846 for sale in Concord Radio's catalogue for $50 and ordered it. A month or so later, I received it. Building a power supply from an early Westinghouse color TV and using my folks' 12" Admiral as a monitor, I had the satisfaction of having the camera working. Later on, at the local RCA distributor, I noticed a box on the shelf containing an 1848 iconoscope. I asked if were for sale. The counterman could not find it on any of his price lists, as it was obsolete. When he asked the manager for a price, he said I could have it for $10. Naturally, I bought it on the spot.

That is one tube I should have kept, as I have never found another. I sold this tube and the camera to get the money needed for my first car. I have always regretted not keeping the camera, as for the past ten years I have been actively collecting these tubes with a passion. If any one has any of these early iconoscopes, please let me know!

Among the receiving tubes, the most sought-after are the pre-war RCA 1800-series. The lowest numbers, the 1800 and 1801, were offered to experimenters in 1938, letting them build their own television sets. They were 9" and 5" in diameter and were unusual in using a yellowish phosphor, as good white phosphors had not yet been developed.

The types 1802-1805 did have white phosphors and were the ones used in the pre-war commercial sets. They varied in diameter from 5" to 12" (the

1803/12AP4, which was used in the "mirror-in-the-lid" sets introduced at the 1939 New York World's Fair). Types 1806-1818 were not all used for television, most of them being radar display tubes. Many of these were labeled with the more conventional numbers by which they are best remembered: 3EP1, 5JP4, 9AP4, etc.

The next group were the camera tubes, starting with the 1840 Orthicon, succeeded by the 1846 through 1850 iconoscopes. The 1846 and 1848 are the easiest to find. The 1846, as mentioned above, was used in the military cameras, while the 1848 was employed in early field broadcast cameras. The 1847 was an inexpensive low-resolution tube for experimenters and amateurs. The 1849 and 1850 were film-chain camera tubes, prewar and postwar respectively. Then came the octal TV-receiver tubes, the 1851 (low-capacitance 1852), 1852 (6AC7) and 1853 (6AB7).

The 1854 is an Image Orthicon tube, while the 1855 was a radar scan-converter known as a "Graphechon." The last series of the 1800s were the 1898 and 1899 monoscope tubes which were used to generate test patterns. Monoscopes are in great demand, particularly those that incorporated the station's ID. The above listings are the ones that I know of, although others (Dumont, etc.) may exist.

RCA made a number of interesting tubes after the war but the numberings are scattered, such as the 5527 (a 3" iconoscope), the 2F21 (an Indian-head monoscope), the 2P23 and 5820 image orthicons and the 6198, an early vidicon.

Dumont and other companies made some very interesting CRTs. Their pre-war picture tubes included 14" and 20" onion-shaped monsters with thick necks, that were the largest direct-view kinescopes of the pre-war period. The 30BP4, a metal-cone design included in their 1952 Sovereign sets, was awesome in its massive size.

Even scarcer are the Farnsworth image-dissector camera tubes and foreign types like the EMI Emitron and the CPS Emitrons. Occasionally you may run into developmental tubes such as Bro. Pat Dowd and I have, that require knowledgeable people to identify. Some RCA items I have found include an Image Iconoscope, an Image Isocon and an early single-gun color Vidicon!

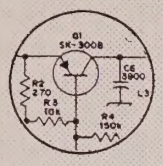
Oscilloscope and small display CRTs are also becoming great collectibles. The best way to display these tubes is to have stands made out of wood or plastic so that you can put them on a shelf for everyone to see.

Technical information on these tubes is available from old industrial-tube manuals and such sources as the Radio Amateur's Handbook. If you are interested in another field of meaningful collecting, this is something you should surely look into. A visit to Brother Pat's collection at Manhattan College in New York City is a testimonial to his dedication and interest in the development of the electron tubes that advanced our communications to their present status. Naturally, you need not try to emulate what Brother Pat has done but it may give you the incentive to build a modest and representative collection of your own.

SOME EARLY CAMERA TUBES AND CRTs, AND THEIR APPLICATIONS

902: I-161 test set
905A: 5" P1 scope tube
906/3AP1: Supreme 546 scope, etc.
907: 905 with P5 phosphor
908A: 3" P5 scope tube
909: 905 with P2 phosphor
910: 906 with P2 phosphor
912: 5" P1 scope tube
913: 1" P1 metal scope tube, shaped like 6L6; RCA 151 scope
914A: 9" P1 scope tube; RCA 305B
1802P1/5BP1/5NP1 (VT-111): BC-403, -612, -956 radar indicators. P4 version: RCA TT-5, RCA TRK-5, GE HM171, GE HM185 TVs
1803P4/12AP4: Andrea 2F12, RCA TRK-12 TV.
1804P4/9AP4: RCA TRK-9 TV.
1805()/5AP() [shortened 1802]: Andrea 1F5 TV; BC-1112 radar monitor
1806P1/3EP1 (VT-226): BC-741A, -750A, -910A radar monitors and test sets
1808P1/3CP1 (VT-248): Dumont 224 scope
1809P1: Dual-numbered as 9JP1
1810P1/VCR139A (British): Radar indicators
1811P1/7CP1: BC-1213B and BC-1214A, ATK, and ID-66/AXR-1 airborne TV receivers
1812P5/5FP5: BC-741A, etc. radar indicators
1813P1/7BP1: BC-954 radar oscilloscope
1814P1/2AP1: TS-34/AP oscilloscope, etc.
1815P7: Dual-numbered as 12AP7
1846: BC-1211B (SCR-549B)/ATJ airborne TV camera
1847: Superseded by 5527
1848: BC-1211-T1 and -T2/ATJ early-model airborne cameras; superseded by 1846
1849: Superseded by 1850A
1850A: High-resolution iconoscope
1854: Dual-numbered as 6474
1855/6896: Radar-to-NTSC converter
1898: Monoscope, with girl's-head pattern
1899: Monoscope, with Indian-head pattern, superseded by 2F21; shaped like 5" CRT
5FP4A: 5" tube for viewfinders in TV cameras

Main sources: T. O. 08-1-25, 1944; MIL-HDBK-213A, 1963. For the history of the military airborne TV systems, see *Proc. IRE*, June 1946, and *RCA Review*, Oct. 1946. For good information on all CRTs, see Peter Keller's The Cathode-Ray Tube - Technology, History, and Applications.



TRANSISTORLAND

EDITED BY
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IN THE BEGINNING, ETC.

Welcome to Transistorland, an enchanted place where true "Solid Staters" will find a home. As I inaugurate this column, let me emphasize that this will be both an information and a fun repository. That's because transistor and 1940s+ germanium radios are the descendants of the more serious and developmental sets that preceded them by almost a third of a century. But these newer products are usually built of colorful plastics, imaginatively designed, mostly portable, frequently unusual, and generally associated with good times. Many transistor sets come in ingenious packaging that's fun to own and exhibit (presentation cases, et al.) as opposed to utilitarian wooden or brown cardboard boxes, with printed materials and colorful catalogs that are entertaining to read. In fact the language known as "Japlish" began in the instruction manuals, technical data and catalogs that accompanied these sets. This moniker is real and is used because the Japanese were forced by circumstances to incorporate many electronic terms in English (read: American) into their language. The experience of transistor collecting often transcends the radios and is greatly enhanced by obtaining the entire "package." Additionally these sets have the uncanny ability to take us back to a more youthful and certainly simpler time. Okay, kids, you get the point and that's enough schmaltz anyway.

KEEP THOSE CARDS & LETTERS COMING IN

Before the serious stuff this month, a few pieces of back business. I was more than amused when at the January 22 NEARC meet a fellow came running up to me first thing in the morning shouting "Henry, you're not mad at me, are you?" Looking Bill Wade (*OTB*, Feb., 1993, page 52) squarely in the face, I laughed and said "no." I told Bill that his letter to the journal was much appreciated because it underscored matters that had been aimed at me by a few other readers, mostly, but not all, those with strong self interests. I thanked him for providing Editor Sibley the opportunity to respond. Actually the mail that heads my way is running about four to one in favor of the article, so keep those cards and letters coming in.

THE CASE OF THE STALE SCALE

I was, however, somewhat chagrined when at the same meet John Terrey, publisher of *A. R. C.*, told me that an article I'd penned some 14 months earlier would appear in his February issue. As many of you have read the piece called "A Grading System for Pocket Radios," it must be amended with the following comments. The system I developed is sound (comments and improvements are, of course, invited) and I currently use it for those collectors who want or need a rock-solid dependable scale rating of the condition of a particular radio. What disturbed me was that when I wrote the piece, the radio collector's world was a different place and that I hadn't been invited to update the material. Today, unlike 18 months ago, many collectors, most of them new to the hobby, are demanding that transistor sets work, and work properly. They are far more particular and better informed about all aspects of the hobby than ever before. In addition, the maturation of transistor collecting has given rise to a great number of collectible transistor radios reaching the market. A little over a year ago I suspected that only a few dozen TR-1s were in collectors' hands. I'd estimate the number has increased by at least 100% since that time. Additionally, sets that were virtually never seen are surfacing, now that "the word is out." So the climate of the piece is out of sync. The scaler measures enumerated are not.

PUTTING THE BOYS TO BED

Two issues ago, when I began to write about transistor sets I made a minor *faux pas*. I referred to the "Boys Club" as traditional collectors who traded rather than bought and sold. The problem was that I inadvertently omitted the word "transistor" after "traditional" and so offended a large group of people. To set the record straight, the "Boys" Club" to which I referred is a core group of ten to 12 serious long-time transistor-radio collectors who do not necessarily appreciate the rest of us, especially me - not the general population of old-time radio collectors to which I belong.

ASLEEP AT THE WHEEL

Bill Burkett recounted, in a recent phone call, that a small number of collectors had called him to complain about my review of his "Collecting Early Transistor Radios" videotape. He, of course, had no problem whatsoever and generally agreed with the piece. In fact, he said that he had viewed the tape only once prior to releasing it and that a friend had recently visited, asking to see it. Bill told me that, shortly into his second viewing, it put him to sleep. Well, Bill, I still recommend the tape wholeheartedly and suggest that those with no interest in transistor radios consider this an inexpensive drug-free soporific.

WHEN A "DONE DEAL" AIN'T DONE

All too frequently transistor-radio deals fall through. I suspect the main reason is that most inexperienced collectors have no real idea of the value of these sets. They accept the first offer that comes through and when the phone keeps on ringing and the offers keep rising, don't know how to back out of their sales commitment. The following list prepared with the aid of several major collectors, including Rip Van Burkett, is presented for your consideration.

MISTER TRANSISTOR'S TOP-TEN LIST OF "WHY A DEAL FELL THROUGH"

10. I had a "shelf accident" and the set was ruined.
9. I dropped it while I was packing it and the set was ruined.
8. My wife wouldn't let me sell it.
7. My son, daughter, brother, mother, dog, etc. wouldn't let me sell it.
6. Some family member stepped on it.
5. I stepped on it, or sat on it while packing it.
4. My dog bumped the table and it dropped.
3. I just can't find it now (this generally applies to sets worth over $200).
2. As I was trying it out, a battery exploded inside the case and ruined it.
1. It was in the box when I sent it. Sure glad it was heavily insured.

To be sure, while the order of these is meant in fun, all the excuses have been used at one time or another. Even I'm guilty of using one of them once and, no, it wasn't number one.

BUY THE BEST, REJECT THE REST

During the past few months many neophyte transistor collectors have called, imploring me to find them various cheap radios. Whether it's a matter of color, style, country of origin or pure whimsy, I make one important point which I want to pass along to you. Don't buy cheap stuff because it's cheap. You'll only wind up with a junk collection. I know that many people are stockpiling all the transistor radios they can find. That's their business and some may know what they're doing. But for the person who wants to build a genuine collection, this is the wrong approach.

Consider that we have all generally begun collecting radios by purchasing anything that we've found. I have a basement full of garbage to attest to this behavior and I suspect most of you do as well. With sets as small as transistor radios, the temptation and fulfillment is easy but you'll generally lose in the long run. Most sets are NOT collectible. If you don't know what to buy, remember that I frequently mention those models that are worth having in my column. And that some of the other collectors who advertise in *A. R. C.* will at least steer you in the right direction. If you buy a pile of junk you'll wind up with a junk pile.

How often have we seen the result of a buying frenzy manifested at some meet where a poor soul tries to move a box of dozens to hundreds of radios for a few dollars apiece or less. Unless you want to join him or her in a "fire sale" with 'transistors by the pound,' stick to the collectible or semi-collectible sets and try to obtain them in mint to near-mint condition. Enough of these radios have surfaced to satisfy the needs of the market in most cases. The TR-1 is an exception, as are several other super high-end sets, but most of the mediocre mid-Sixties-on junk from Japan, Hong Kong and the remainder of the Pacific Rim is not currently worth anybody's time or money. It wasn't when it was new and it certainly isn't now. A decade hence, who knows?

CRYSTAL CLEAR

Along with the upsurge in transistor collecting comes a recent and intense interest among a small group of collectors in late 1940s, and all 1950s, crystal or germanium radios. I differentiate these two forms of basically similar radios for one reason. The early crystal sets generally no longer work. Their sealed cats-whisker crystal detectors have long since lost their nine lives.

Germanium diodes, however, live on and all of the sets I've had "worked" to a greater or lesser degree. I mention these radios because along with popularity comes price. Yes, folks, some of these guys like the Tinymite (seen in Collins' latest book and last year's calendar) are the *ne plus ultra* of the crystal world and as such command multiples of hundred dollar bills when found mint in box. Many other sets are also expensive when mint or new-in-box with papers. It is rare to find a decent crystal/germanium set for under a hundred dollars these days, so it may pay you to look in the back of the drawer before somebody else does.

I further suspect that the fascination with these radios is similar to that observed with transistor sets -- lots may be housed in a small space, designs are numerous, the sets are fun, etc. And for some, the mistaken belief that this is the last bastion of low-priced collectible radios. Well, it's not any more but the rest stands.

ONWARD AND UPWARD

Next time around, I'll answer some of the faxes, mail and calls I've received. I invite disgruntled transistor collectors to send me their stories of deals that just didn't materialize so I can share them with you. Also, I'll be discussing in detail many of the core collectible radios that all serious aficionados must own. So as usual, please call, write only if you must, always include a phone number, etc. The numbers are (201) 585-0030 (voice) and (201) 585-1659 FAX, and I would like to thank those readers around the world who have contacted me. It makes this whole venture much more worthwhile.

AMATEUR RADIO

EDITED BY
Mike Raide, KF2MW
Box 181, Bloomfield, NY 14443
Please include SASE with correspondence.

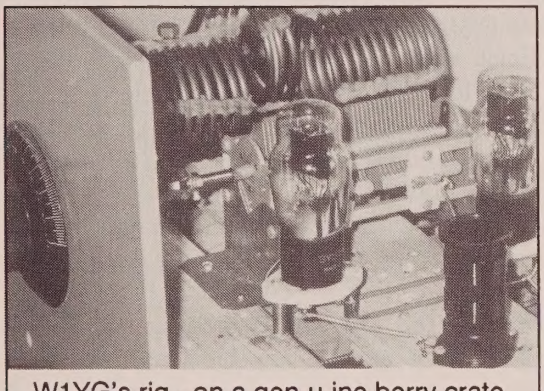
1929 TRANSMITTER QSO PARTY

"Bud" Hall, K2LP

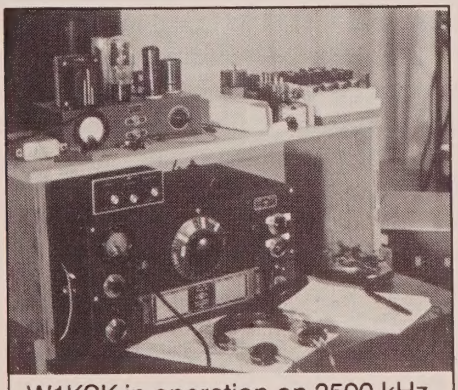
AWA's 1929 QSO party was a huge success, judging from the number of logs and encouraging letters received. Conditions on the first evening were excellent. I could hear the fellows tuning up their oscillators for maximum output beginning at about 5:30 PM and set up a camcorder with good sound features to capture this exciting moment.

At 6 PM all heck broke loose with "CQ AWA, CQ AWA," etc. "By" Goodman was the first signal heard with his very stable PDC note; he always brings real "class" to our events. The wind was howling something fierce on Cape Cod but didn't seem to give my 210 TPTG any undesirable effects. It was T7 to begin with.

Some "new" Old Timers were heard banging away in the pileups, W2ER and W2ZM notably. This pair really know how to operate and can hear and copy the weakest signals. Parker, W1YG, had a humongous signal, with stations calling him from all sides.



W1YG's rig - on a gen-u-ine berry crate.



W1KSK in operation on 3590 kHz.

CALL	QSOs	EQUIPMENT	HANDLE
W1YG	43	PP 210 TPTG, 9 W; HQ-120	Parker
W1KSK	34	210 TNT, 5 & 9 W; '37 HRO	Bob
W1DX	26	45 TNT, 6 W	By
W1SZJ	19	226/245 Hartley, 6.5 W	Poco
W1YJ	19	45s TPTG, 7 W; 32/30 HB	Harvey
W1DCD	18	45 Hartley, 5 W	Fred
NV1X	18	PP 45s TPTG	Bob
W1NV	10	45 Hartley, 9 W	Bob
W1FPZ	7	PP 210s TPTG, 9 W; FB-7	John
W2ER	45	PP TPTG, 10 W	Marshall
W2ZM	44	45 Hartley, 9 W	Bob
W2BJI	41	UV-202 Hart., 9 W; HQ-120	Fran
W2KFG	40	46 TPTG, 9 W	Jack
W2LYH	39	211 Hart., 9 W; '38 HB super	Bob
K2LP	37	10 TPTG, 9 W	Bud
W2KTU	28	45 TNT, 9 W	Edward
K2OA	28	210 Hartley, 5 W; HQ-120	Stu
N2EZ	27	210 Hartley, 9 W	Arnold
W2CFY	23	TNT	Henry
W2VDI	22	3 par. UV-201As, 6 W; FB-7X	Fran
W2FCH	21	TNT, 10 W	Herb
AA2ID	18	TPTG, 8 W	Harold
W2AN	18	UX-210 TPTG, 4 & 9W	Bruce
W2FB	17	45 Hartley, 9 W	Howard
W2FW	16	10 TPTG	Jack
KC2LK	8	Hartley, 3 W; Grebe CR-18	Bob
W2FFU	6	71A TNT, 5 W	Harvey
N2FCZ	5	2-210s Hartley, 9 W	Henry
W3BYM	32	45 TPTG; SX-24	Tom
WB3HLH	26	UX-210 TNT, 8 W; SW-3	Tom
W3VVS	23	210 Hartley, 9 W	Paul
W3DB	14	Hartley, 9W	Dave
KD3OR	14	10 Hart., 9 W; 2-201As regen	Rodney
W3INV	12	10 TNT, 3 W; '33 autodyne	"Ace"
W3MNE	12	210 TNT, 9 W; regen	Larry
W4VBX	29	210 TNT, 9 W; '36 HRO	Don
AA4RM	24	Hartley, 10 W	Marty
N4EE	20	TPTG	Wells
K6ILM	1	210 Hartley, 2 W; SW-3	Elliott
W6TDP	1	210 TNT, 9 W	Henry
W8JYY	31	UV-202 Hartley, 9 W	Ed
WD8OFB	2	Hartley, 2 W	Milton
WB9K	16	210 TNT, 9 W	Dave
KC0CW	13	UX-210, 9 W	Sheldon
W0OG	4	TNT, 9 W	Larry
VE3CLX	22	45 Hartley, 9 W; SW-3	Jim

On the second evening the CW nets which operate in this part of the spectrum gave us a lot of trouble with overloading. By Sunday propagation had deteriorated drastically.

My admiration is for the fellows who use home-brew or vintage receivers in this event. WB3HLH and VE3CLX employed National SW-3s; W3LYH, a home-brew 1938 superhet; W1FPZ, a National FB-7 (1934); KC2LK, a Grebe CR-18 (*that's* "vintage"!). W3OER used a Pilot Super Wasp and was able to hear me . . . Amen.

Many detailed letters have been received, along with a marvelous set of color pictures of W1YJ's vintage equipment. W1KSK also sent two wonderful shots of his neat set-up and Marty, AA4RM, operating his '29 breadboard. Thanks, guys.

Marshall, W2ER, was high man with 45 QSOs with Bob, W2ZM, in second spot at 44 and Parker, W1YG, third with 43. This was the first time in the 1929 QSO Party for Marshall and Bob - nice going, fellows. Bruce, W2AN, had his power supply blow, curtailing his time on the air.

Special mention should go to W1NV and his "spark." What a thrilling sound! W6TDP reports that W1YG, AA4RM, N4EE, W8JYY, and W0OG were heard on the West Coast. This reporter has received 46 logs. Known to have participated but no log received: KA2RLK, WA2DAC, NA4G.

600-METER MARINE RADIO DISTRESS WATCH BOWS OUT

Robert M. Morris, W2LV
RD 1, Box 60, Sparta, NJ 07871

During the Christmas holidays, I was monitoring 20-meter sideband one afternoon and suddenly became aware of a voice saying something to the effect that the U. S. Coast Guard was going to discontinue monitoring 600 meters (500 kHz) for distress calls and other medium-frequency radio traffic. This hit me with a shock and for a few seconds I wondered if I had really heard right. This, if true, would represent the end of an important radio era.

At the January meeting of the North Jersey DX Association, I raised the question as to whether anyone else had heard this news or knew anything about it. It so happened that a visitor that evening was a retiree from the Coast Guard. His name was George Hall, with very appropriate call letters N2CG. He said he had heard nothing to indicate that such action was contemplated, but he would make inquiry and let me know what he found out.

A few days later, I received a letter from him with the following information. He called the big Coast Guard station NMN in Portsmouth, VA, from which he received the rather surprising news that, since there are so many alternate means for a vessel to make a distress call, the USCG would be terminating its guard on medium frequency (500 kHz) effective 1 August 1993. They will, however, contineue CW telegraphy on the maritime HF bands.

I also received from Leo Cunniff, W2OEH, a copy of a publication containing the official Coast Guard order quoted in the box.

This is truly the end of an era in radio. After more that 80 years of dedicated and sometimes heroic service, the shipboard radioetelegraph operator becomes history.

> Effective August 1, 1993, all United States Coast Guard communication stations and cutters will discontinue watchkeeping on the distress frequency 500 kHz, and will cease all Morse Code services in the medium-frequency radiotelegraphy band. More efficient telecommunication systems are now available to provide the mariner with options for initiating or relaying distress alerts, and passing and receiving maritime safety information. These options include INMARSAT, Radio Telex (SITOR), MF-HF single sideband and VHF radiotelephone, and satellite EPIRBS (for distress alerts and telecommunications), and INMARSAT safety-net, Navtex and HF Navtex (SITOR) (for maritime safety information broadcasts).
>
> Navtex broadcasts include the same notices to mariners, weather, search and rescue, and fixed fishing-gear location products that have been provided by the MF Morse broadcasts. Distress and other calls to any US Coast Guard communication station can also be made on any of the following HF single sideband radiotelephone channels: 4134 kHz, 6200 kHz, 8240 kHz, or 12,242 kHz. Meteorological broadcasts are also made on these channels. We believe these options provide sufficient redundancy to ensure that adequate distress and safety communication capabilities are available.
>
> Signed,
> Capt. R. Hammond
> Deputy Chief
> Office of Command, Control and Communications
> U. S. Coast Guard

ORIGINS OF AMATEUR RADIO IN JAPAN

Jun Yatsuyanagi, JH8SST/7
1-7 Hinai-machi, Araya, AKITA-City, 010-16, Japan

QSL FROM AJ-JXIX
W2XAF
Dec, 10, 1928.
Mri Xmas,
ARRL JXIX JARL
RCVR: DET ES ONE STEP, BALDWIN 'C'.
XMITTER: L.C.H. CKT. a CX-310 TUBE. QRH 38 M.
ANTENNA: 2nd HARMONIC: current FEED.
DX WKD: 5 CONTINENTS. HR OLD AJ-3AA.
QRA: K. KASAHARA 880 TENNOJI-CHO OSAKA JAPAN.
住所 大阪市住吉區天王寺町八八〇 笠原功一
PSE QSL BEST 73'S, SIG

Bruce Kelley's article "Rare Amateur QSL Cards" that appeared in the February issue of the *OTB* is highly interesting to me because a QSL of JXIX, K. Kasahara - one of Japan's greatest pioneers in ham radio - is shown.

I would like to introduce old-timers in ham radio briefly to the early days of Japanese amateur radio and the organization of the JARL, referring to the Japanese-language publication "50 Years of the Japanese Amateur Radio League."

The book tells that in 1920, radio amateurs were enjoying reception of CW signals on 4000 meters or thereabouts, transmitted from quenched-spark gear, and manufacture of the type UV-201 tube was being researched at Tokyo Electric Co (today's Toshiba). In 1922, not long after KDKA performed its world-first radio broadcasts, our first broadcasting experiment was done.

In 1924, a few amateur groups appeared enjoying phone communications on 200-300 meters (1000-1500 kHz). Taro Yagi (1ZB, J1DO, J2GX and JH1WIX) and Kuninosuke Nakagawa (J1EE, J2HI and JR1LDR) were members of the groups. They used transmitters with a one-tube Hartley circuit, in which modulation was achieved by connecting a carbon microphone in the antenna circuit. The groups disappeared soon thereafter because the Japanese communication authority began to monitor waves from these undercover stations for the beginning of official test transmissions from JOAK - today's NHK Tokyo - in 1925.

The first ham QSO on short waves was done in 1925 by Kenichi Kajii using a call sign of JFMT (later 3AZ, J3CC and JA1FG) and Kouichi Kasahara using JAZZ (later 3AA, JXIX, J3DD, J1EZ, J2GR and JA1HAM). The distance between JFMT and JAZZ was about 12 miles. Diagrams of JFMT's transmitter and receiver are indicated in Figure 1. Soon after this historic QSO was performed near Osaka, independent hams appeared around Tokyo.

In 1926, those early Japanese operators organized the Japanese Amateur Radio League. The following message was transmitted overseas from the members on 12 June: "We have the honor of informing you that we amateurs in Japan have organized today the Japanese Amateur Radio League. Please QST to all stations." *QST* magazine, in the U.S., introduced this message on page 48 of its August 1926 issue. The number of JARL members was 37 at this time, among them M. Ibuka, 3BB, late president of SONY.

By 1927, these stations were under cover but the first official licenses were given to JXAX to JXHX, that year. JXIX was licensed soon after. This official birth of the Japanese ham is illustrated by a cartoon (Fig. 2) which appeared in MJ magazine in that year. The adult pelicans represent American and European amateurs, hi!

The license was not for an amateur station, exactly speaking, but for a "wireless telegraph and telephone experimental station" and the Japanese communication authority severely suppressed the

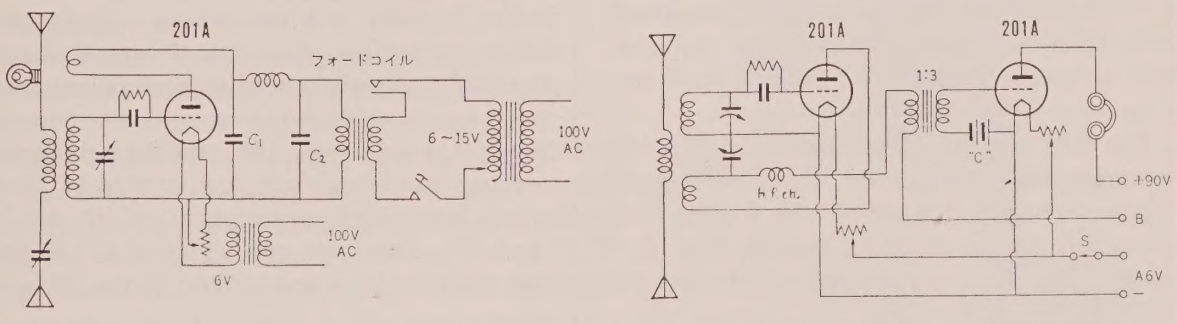


Fig. 1 - Schematic diagrams of the transmitter and receiver of JFMT. B+ for the transmitter was obtained from a high-tension coil of the type used in Ford Model T cars and was not rectified. The receiver was a typical 0-V-1 regenerative type.

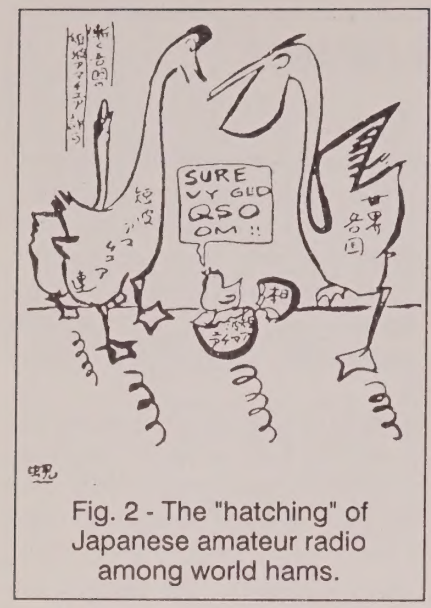


Fig. 2 - The "hatching" of Japanese amateur radio among world hams.

activities of the licensed stations for some reason. A cartoon (Fig. 3) indicates the resistance of the JARL to official strictures. This suppression lasted until the end of WW II, 15 August 1945.

Soon after 8 December 1941, transmission was prohibited. The number of licensed stations was 331 at that time and the number of undercover stations was about 30 - very few compared to those of other nations. No signal was transmitted officially from Japanese ham stations until 1952, when the first 30 postwar stations were licensed - JA1AA through JA8AA - receiving the "true" license of Amateur Radio.

The first ham, K. Kasahara, JFMT, was gone long ago and K. Kajii, ex-JAZZ, died recently. A historical one-tube transmitter left by JFMT is exhibited in the JARL Museum, Sugamo, Tokyo, and his QSL is in the AWA archives.

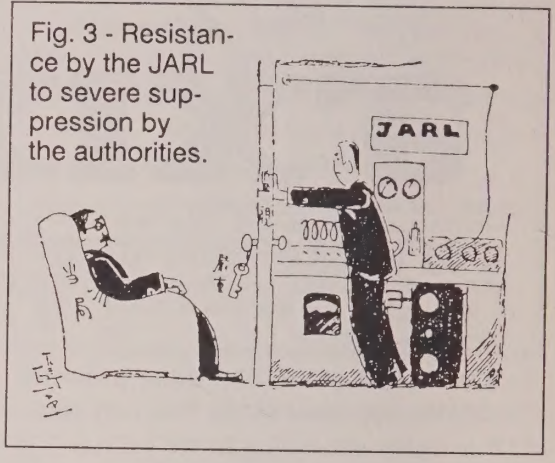


Fig. 3 - Resistance by the JARL to severe suppression by the authorities.

HOW TO INSTALL GRILLE CLOTH - AND OTHER NOTES

John Okolowicz
624 Cedar Hill Rd., Ambler, PA 19002

Here are a few ideas on how to handle grille cloth and install it in your set, as a follow-up to the previous article (*OTB*, Nov. 1991).

As mentioned last time, if you want to install your cloth with a minimum of wrinkles, be sure to iron it first, using a household iron set for "permanent press" with steam. You can use some spray starch, but if you want to kill the shine and add a little stiffening at the same time you can resort to Krylon's Matte Finish spray No. 1311, for about $5.75 for an 11-oz. can. It dries in about a minute.

A great way to stretch the cloth before mounting was suggested by D. K. Owens (Circleville, OH). Mount the cloth in an embroidery hoop of appropriate size before attaching to the cabinet or, more commonly, to the cardboard backing. Leave the hoop intact until the glue is dry and then remove. If you use this method, you probably should not use the matter spray described above, as it will tend to thicken the material. These hoops are available in plastic or wood and can be obtained at any needlework or craft shop. Wooden hoops sell for 50 cents each and come as large as 12 inches in diameter, while plastic ones are around $4 and are available only up to 10 inches in diameter.

Use spray adhesive to install your cloth in the radio. You need coat only one surface and apply the cloth almost immediately. I use a product first recommended to me by Ted Hannah of the Mid-Atlantic Antique Radio Club (MAARC). It is made by Camie-Campbell, Inc., 9225 Watson Industrial Park, St. Louis, MO 63126, phone (314) 968-3222. An 8-oz. can costs about $8. You can also try the spray adhesives made by the 3M Company, that are more readily available from any hardware store. The 3M products are much thinner and wetter than the Camie-Campbell product. Be careful to wait until you are sure the surface is tacky, not wet, before applying your cloth to the surface. Failure to do so will saturate your cloth and make a permanent discoloration.

Our *OTB* needlecraft consultant points out that embroidery hoops were, um, obviously designed with radio restorers in mind. Hardwood hoops, as surveyed locally, come in sizes of 3" to 14", in 1" steps. Spring hoops, which offer a quick-release feature, are typically available in 3-½", 5", and 7" sizes. Plastic hoops come in sizes of 4", 5", 6", 8" and 10". There are oval styles of 5" x 9" and larger. And, for really big cloths, there are embroidery stretcher bars and quilting frames in huge sizes like 18" x 26". - LAS

KEY and TELEGRAPH

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Please include SASE with correspondence.

CAMELBACK CONFUSION

If the peculiar-looking "camelback" in the photos were offered to an eager key collector, it probably would be snapped up first, with questions asked later. A word of caution: the key pictured is actually a strap key, and was never intended for, or used in, landline telegraphic service. Strap keys

were used for testing circuits or breaking a bell or alarm circuit -- any application that required momentary circuit opening or completion, other than transmitting code. Most strap keys have a rather unwieldy lever fixed at one end of a wood or composition base, with single or double contacts.

The key pictured was used on municipal fire alarm test boards built by Gamewell following the turn of the century, and is usually called a "tapper key" by fire alarm engineers. The reddish, marbled knob on the lever typically has a number engraved on it, denoting the box alarm circuit in which it was inserted. There are no other markings on the key or its base. They were mounted vertically, which accounts for the odd angle of the lever when the base is in the horizontal position one assumes is right -- but isn't.

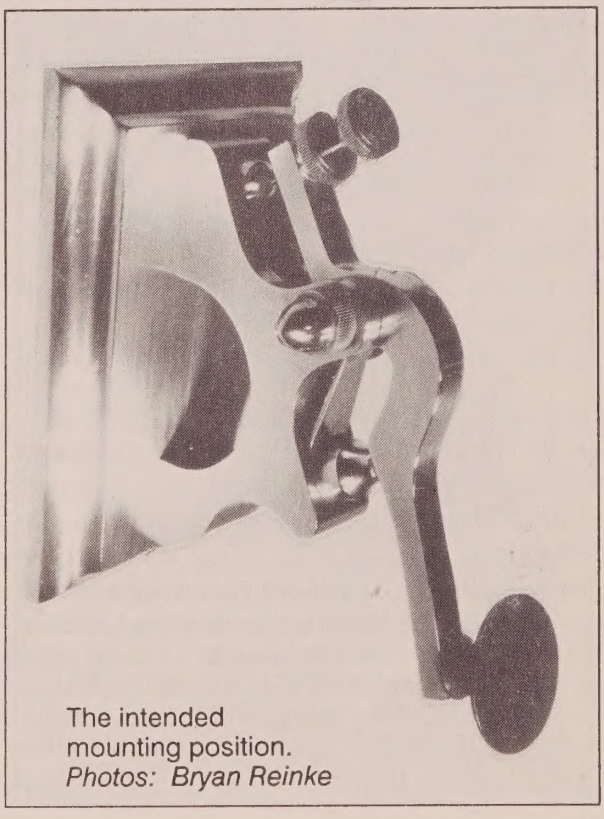
Gamewell didn't spare the expensive finishing of these heavy, all-brass keys, which tends to mislead a potential collector, as does the fancy, chamfered brass base. There are a few fairly obvious warning flags, however, that should alert the unwary. There's no circuit-closing provision, there are no adjusting screws for the trunnions, the angle of the lever precludes normal sending posture, and the stiff, non-adjustable leaf spring makes any thought of code academic, unless you're a glutton for punishment.

Still doubtful? Turn the key over. The two mounting bolts are rather thin, compared to the bolts on a conventional leg key, and they reveal that the key is the equivalent of a single-throw, normally closed switch. The insulated leg is connected only to the front anvil (in contact with the single adjusting screw and nut), so actuating the lever simply opens the circuit and nothing more. This camelback looks great mounted vertically on a fire alarm board, but it becomes only a curiosity anywhere else.

Over the years, Lou Moreau, W3WRE, has answered many questions in "Key and Telegraph," and offered a valuable perspective on telegraphic history. I hope readers will continue to ask questions about this arcane topic and its artifacts. We won't guarantee 100% right answers, but with the knowledge of *OTB* readers and guidance by the Bulletin editor (who, incidentally, actually carries around some telegraphic genes -- remember Hiram Sibley?), we should be able to help solve some of the riddles. Don't hesitate to write.

REFERENCE

Ditzel, Paul, Fire Alarm (New Albany, IN: Conway Enterprises, Inc., 1990), p. 55.



The intended mounting position.
Photos: Bryan Reinke

THE LOUDSPEAKER

EDITED BY
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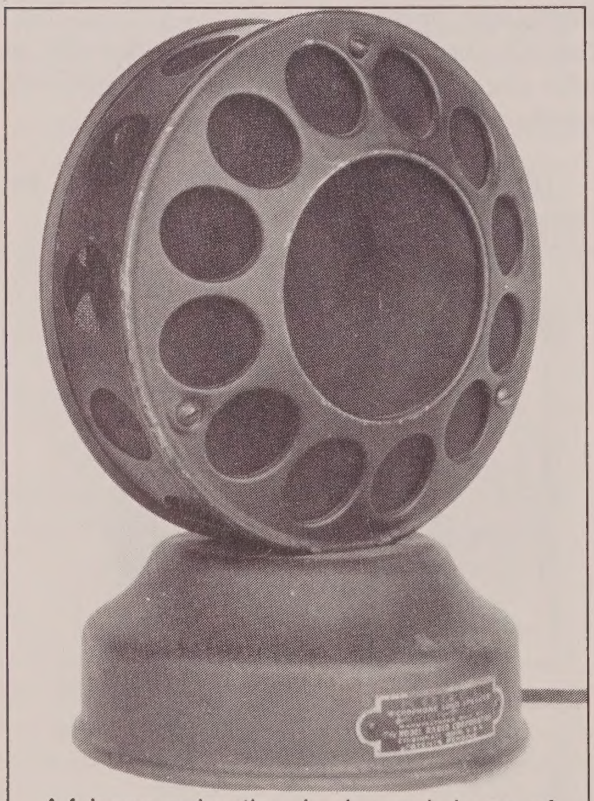
All correspondence requires SASE for reply

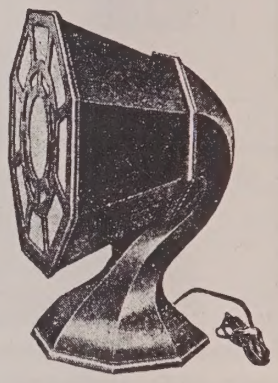
KODEL RADIO CORP.

First, a historical note is necessary. An announcement in the monthly *Radio Retailer & Jobber* of February 1925 noted that Automatic Electric Devices had purchased Kodel Manufacturing Co., makers of a varied line of radio receivers. An advertisement in the September 1925 issue of *Radio Retailing* covers two horns: a taller-than-wide cabinet model selling at $27.50 and a gooseneck-shaped (cabinet-style) horn at $25. In the Fall of that year Kodel Radio Corp. brought out a radio horn speaker. *Radio Broadcast* magazine first advertised Kodel Microphone speakers in October. A *Radio News* ad followed in November. The ads highlighted the size and appearance of the speaker: the same as microphones used in broadcast studios. They described the sound unit as an ingenious new snail-shell horn producing a remarkably clear full-tone volume. The price was listed as $15 with the Kodel Junior reproducing unit or $20 with the regular large Kodel unit.

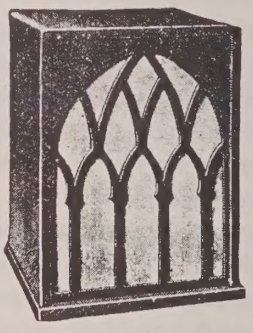


A fair approximation, in size and shape, of the Western Electric 600A broadcast microphone; Kodel's base is a little taller. Nameplate reads KODEL MICROPHONE LOUD SPEAKER - SENIOR MODEL - MANUFACTURED ONLY BY KODEL RADIO CORPORTION - CINCINNATI, OHIO, U. S. A. - PATENTS PENDING.

KODEL Microphone Loud Speaker. The sensation of the season; exact replica of broadcasting microphones; has unique snail-shell horn construction - amazingly clear and loud. $20



KODEL "DeLuxe" Amplifier. Combines volume and tone of horn type speakers with dignity of cabinet type; artistic grill over golden cloth screen; beautiful, practical. $25



KODEL Cabinet Type Amplifier. Solid mahogany cabinet; beautiful old gothic lattice work over golden screen; built-in tone chamber. $27.50

Kodel speakers, from the Sept. 1925 issues of *Radio News* and *Radio Retailing*. (There is no known example of the "DeLuxe" or the "Cabinet Type" in a present-day collection.)

The advertisements in *Radio Broadcast* and *Radio News* didn't vary in context for five months, but in March, 1926 the latter contained a Kodel ad showing the company had mounted a shade socket and lamp bulb on a stand pipe above the microphone housing. The ad claimed the shade was made of decorated papyrus. (Webster: *Papyrus: The pith of the papyrus plant, esp. when cut in strips and pressed into a writing material; a writing on papyrus.*) The ad noted the "socket connection is on top of the microphone base - novel, ornamental, decorative."

STODDART AND THE RADIO RESEARCH RECEIVER

Harold A. Layer, KK6HY
P. O. Box 27676, San Francisco, CA 94127

Radio historians have divided the development of radio receivers into several popular categories. Consoles, Deco, Wireless, Classics, Transistors, and Communications are examples of classes based respectively on size, style, historical era, historical significance, circuit, or function.

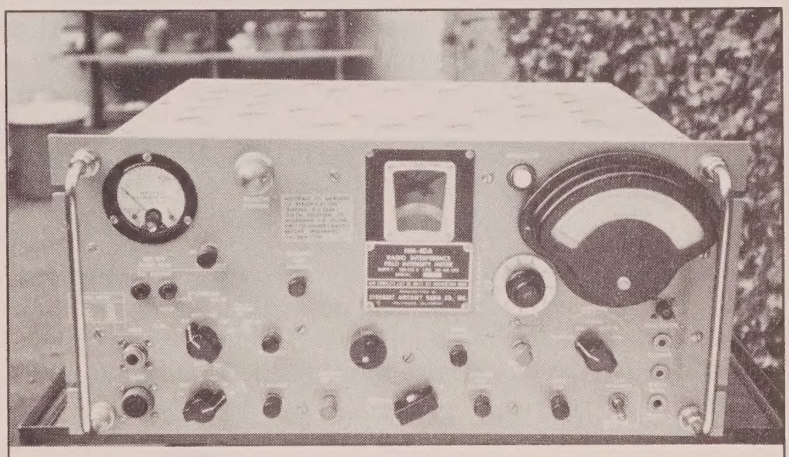
I would like to propose another "function" category that has been neglected, yet vital to the history of radio communications: Research. This category would include those state-of-the-art, laboratory radio receivers designed for scientists and engineers for use in detailed study of man-made, narrowband RF signals; naturally occurring, broadband RF energy; communications surveillance and spectrum-signature plotting; EMF field intensity and radio-interference studies; and antenna propagation surveys and measurements.

The products of no company better represent this category than those of the Stoddart Aircraft Radio Company of Hollywood, California, founded by pioneer radio engineer, Richard R. Stoddart (12-1-1900 - 9-26-72).

According to his official obituary, he began an electronics career at age 15 by working for the Telefunken Wireless Company in New York, although another report indicates that he had a radio contract from Lee de Forest at age 14! After working as a radio operator on merchant ships, he also pursued another interest as a pilot, and barnstormed around the Poughkeepsie Airport during the 1920s. In the 1930s he was a field engineer for NBC. Stoddart and Charles D. Perrine, W6CUH, designed the elaborate radio system for the historic Howard Hughes 1938 round-the-world flight. As the flight's radio officer, he was one of the five-man crew aboard the Lockheed two-engine plane. He coordinated the complex communications links from country to country as the plane flew around the world in a record-breaking 91 hours, 8 minutes at an average speed of 218 miles per hour. The main radio room for this endeavor was at the New York World's Fair.

In 1939 Stoddart worked for Lear Jet, but sometime in 1940 he founded the Stoddard Aircraft Radio Company. In the beginning it designed and manufactured VHF communication receivers and transmitters for airborne use, and these were important for the American support of England during World War II. Also, during the war, Stoddart produced its first research receiver, a VHF unit that featured both an average detector and a quasi-peak detector to measure narrowband and broadband radiation. In 1945, the company added a slide-back peak detector and precision signal calibration with a direct display of "microvolts-per-meter-per-kilocycle." Based on the value of this remarkable receiver to meet the growing sophistication of military communications research, the Navy contracted with Stoddart over the next decade to design and manufacture a group of receivers covering the entire RF spectrum from ELF to SHF. The table includes all that I have been able to identify and date.

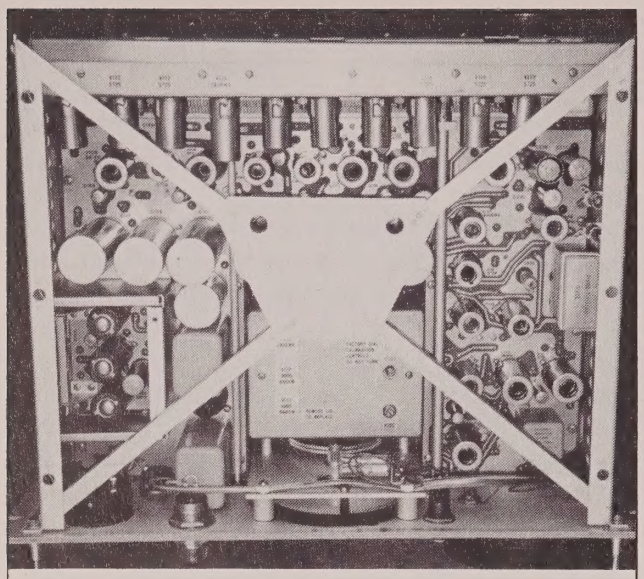
The 1956 NM-40A is a fascinating case study of a Stoddart receiver, sharing the fine design and craft of all Stoddart models. It was one of the most revolutionary receivers of the group as well as one of the most bizarre radio receivers ever made. The NM-40A was the first "audio-spectrum-only" receiver, a scientific instrument that extended downward the detectable and measurable RF spectrum to 30 hertz! The only other audio-spectrum-only receiver found by the author is the Empire NM-315, a 1963 transistor model that tuned from 20 Hz to 15 kHz.



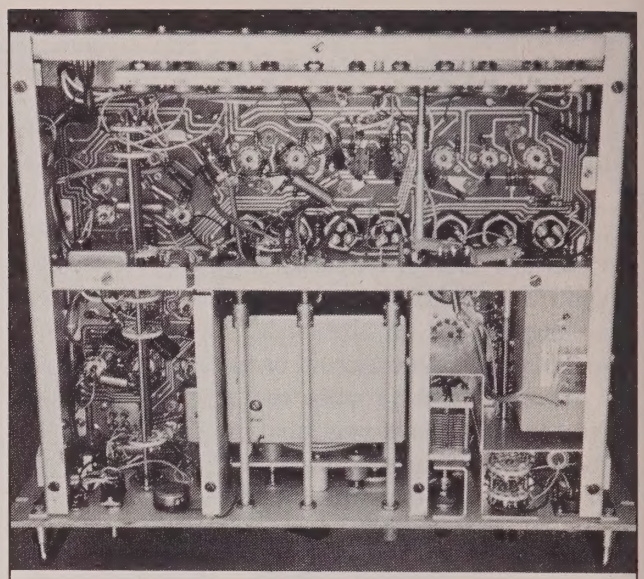
Stoddart NM-40A radio interference field-intensity meter.

In addition to being a narrowband, tunable superheterodyne (0.1−μV sensitivity at 100 kΩ), the NM-40A could also be operated as a broadband receiver (10−μV sensitivity) for such signals as man-made RFI or natural ELF or VLF whistlers and atmospherics. The NM-40A was equipped to receive separately the electrical and magnetic components of a radio wave, and it included the precision detector and metering system that are basic features of a research receiver.

The NM-40A is a single-conversion design with many novel features. It may have been the first



Top view of the NM-40A.

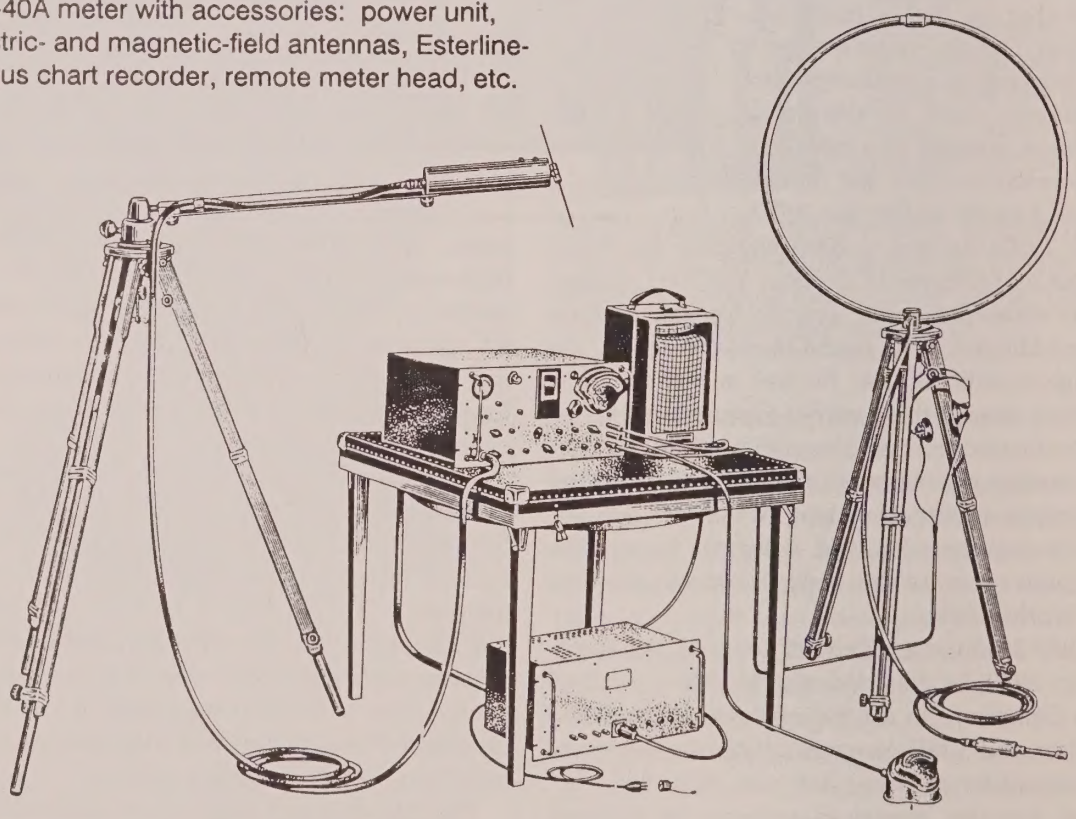


Under the chassis.

radio receiver with a double-balanced crystal quad mixer. Its sensitive, untuned RF amplifier is housed in a rubber-suspended, Mu-metal shielded compartment with additional Mu-metal shields surrounding each of its three tubes. The receiver's local oscillator is a Wien-bridge type, also housed in a separate Mu-metal compartment. The 24-kHz IF section contains four stages, each of which is a two-tube amplifier. Two elaborate rack-and-pinion assemblies connect seven individual bandwidth and equalization potentiometers to coaxial panel controls. This allows the extremely narrow IF bandwidth window of 8 to 60 Hz to be continuously adjustable - perhaps another engineering first for Stoddart.

Many of the NM-40A's components are mounted on a large printed circuit board. A built-in 400-Hz tuning-fork oscillator (± 0.2 Hz) is used to provide a reference signal to calibrate the frequency dial and the output-level meter. This meter is calibrated in decibels and microvolts with a full range of 140 dB (0.1 μV to 1 V). Other features include headphone, oscilloscope, remote output meter, and chart-recorder outputs; a neon-

NM-40A meter with accessories: power unit, electric- and magnetic-field antennas, Esterline-Angus chart recorder, remote meter head, etc.



STODDART RADIO GENEALOGY

Years Sold	Model No.	Military Equiv.	Freq. Range	Price*
1944-	NM-3, -3A	OCV	100-400 MHz	
1947-54	NM-5, -5A	TS-587/U	15-400 MHz	
1949-62+	NM-10, -10A	AN/URM-6	14-250 kHz	
1950-51+	NM-20A, -20B	AN/PRM-1A	150 kHz - 25 MHz	
1954-66+	NM-30A	AN/URM-47	20-400 MHz	$3250 (1966)
1950-66+	NM-50A, -52A	AN/URM-17	375-1000 MHz	$3250 (1966)
-1962+	NM-60A	AN/URM-42	1-10.7 GHz	
1962-66+	NM-22A	AN/URM-131	150 kHz - 32 MHz	$3250 (1966)
1956-66+	NM-40A	AN/URM-41	30 Hz - 15 kHz	$3585 (1961)
1960-	289-1		14-150 kHz**	
c. 1962-66+	NM-62A, -62B	AN/URM-138	1-10 GHz	
1966-74+	NM-12T		10-168 kHz	$5670 (1974)
1966-74+	NM-25T		150 kHz - 32 MHz	$6490 (1974)
c. 1974-79+	NM-17/27		10 kHz - 32 MHz	$14,470 (1979)
c. 1974-79+	NM-65T		1-10 GHz	$18,450 (1979)
c. 1974-79+	NM-37/57		30-1000 MHz	$17,230 (1979)
c. 1974-79+	NM-26T		150 kHz - 32 MHz	$10,450 (1979)
c. 1976-79+	NM-7, -7A		20 Hz - 50 kHz	$9560 (1979)
1977-80+	NM-67		1-18 GHz	$44,000 (1979)

* Retail price of receiver without calibrated antennas or other accessories.

** Pocket-sized (4 x 3-¼ x 1 inch), 12-transistor, superhet receiver with 2 RF stages, 3 IF stages, five crystal-controlled channels (factory-installed), BFO, Collins 500-Hz mechanical filter, and miniature ferrite-loop antenna.

lamp overload indicator; input impedances from 50 Ω to 1000 MΩ (with separate inputs for the magnetic and electrical components of the signal) and detector functions of average, peak, quasi-peak, and RMS. The separate power supply regulates the plate voltage and includes a time-delay relay to lengthen the life of the receiver's 34 tubes. An extensive array of accessories were available for the NM-40A, some of which are shown in the figure.

In 1953 Richard Stoddart was an American delegate to the International Conference on EMI held in London. In 1958 he was made an IEEE Fellow. In 1962 he retired and sold his company to Tamar Electronics. By the early 1970s it had become part of Singer Instrumentation and in the late 1970s merged with the Ailtech division of Cutler-Hammer. In spite of the mergers, the respected name of Stoddart continued to appear on new receiver models well into the 1980s.

Stoddart did not have the field of research receivers to itself. After World War II, such other companies as Empire Devices, Fairchild Electro-Metrics, Ferris, Hewlett-Packard, Polarad, Singer, and Watkins-Johnson entered the market, but Stoddart is remembered as the pioneer company that led the way in the evolution of radio research receivers of outstanding specifications and workmanship. Its influence in the development of radio communications needs further study.

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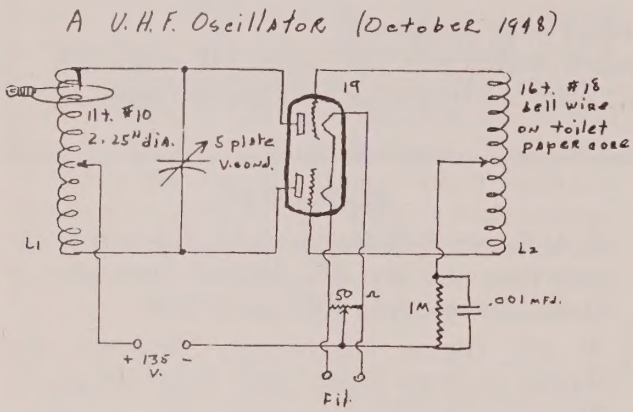
THREE OLD-TIME VHF OSCILLATORS

Rodney Schrock, KD3OR
402 Lincoln St., Somerset, PA 15501

A "VHF" OSCILLATOR

In the fall of 1948, I was leafing through the Students Edition of *Popular Science*, which was a regular copy with an eight- or ten-page supplement fastened to the front. The supplement contained information and home experiments of interest to high-school students.

The project that caught my eye was a "VHF" oscillator - a push-pull TNT using a type 19 tube. The end result was that the student could light a pilot lamp attached to a loop of wire placed over the tank coil. The small number of turns in the coils and the few plates in the tuning condenser (I used a stripped-down Pilot) convinced me this was truly a VHF machine operating on the upper fringes of the RF spectrum.



I built this oscillator using an AK tube socket, an old National coil form, house wire for the output coil, and a toilet-paper core wrapped with doorbell wire for the grid coil. The B+ supply was a simple 117Z6 rectifier and the "A" was a lantern battery with a rheostat. The project worked without any adjustment and I brought in my friends on our way home from school to see this wondrous creation.

Recently I decided to re-create the oscillator. Guessing at the coils, I arrived at 14 turns of #10 bare ground wire for the plate coil, wound on a two-inch tablet container, and 24 turns of #18 enameled on a 1-3/8" tablet container. At first it didn't oscillate, so I guessed there were too many turns on the grid winding. I reduced the turns to 18 and the oscillator worked quite well - 8.5 watts DC input to the plates - 135 V at 60 mA - the frequency being 12.5 MHz.

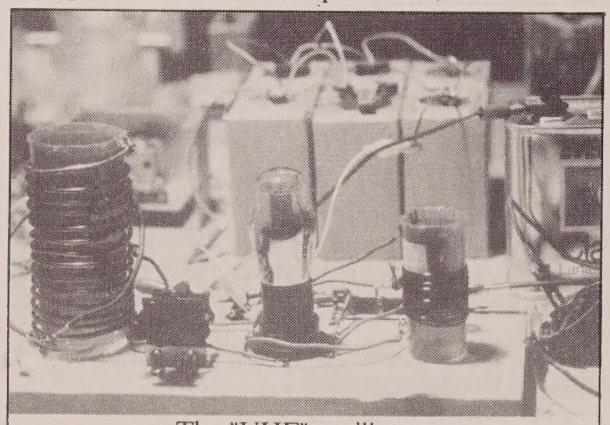
Very close to the original. Hardly VHF, but at one time frequencies were classified differently, as I remember old-time Western Electric literature describing the 30-42 MHz band as "UHF" and the Radio Handbook describing 400 MHz (3/4 meter) as "microwave."

The other oscillator in the article was classified as UHF, using copper tubing as the plate winding and insulated wire threaded through it as the grid coul, the former being tuned by a four- or five-plate variable condenser. I didn't build it at the time, as I couldn't find any copper tubing (should have asked a plumber).

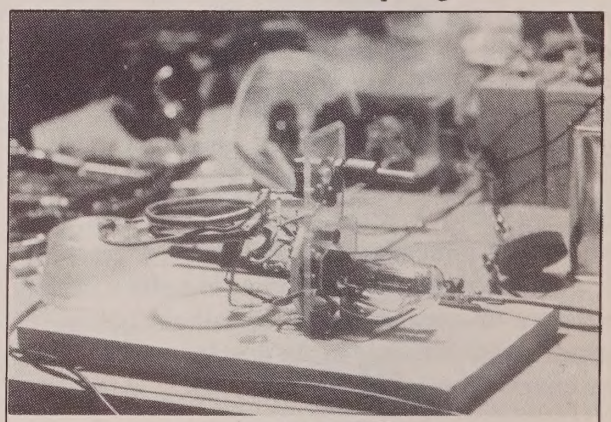
THE "UHF" OSCILLATOR

Recently, I decided to try a UHF oscillator, using a 19 tube in the 5-meter transceiver schematic from the 1936 "Radio" Handbook, page 214. I took a two-foot length of copper tubing and drilled two holes side-by-side in the middle, making a slot. Through the tubing, I threaded into each end a length of #16 solid, well insulated hook-up wire, having first stripped the ends. I brought the ends out through the slot and soldered them, making sure they didn't touch the tubing, and wrapped the tubing around a length of plastic pipe to form a coil. (This is tricky, as the tubing tends to break in the middle. Reinforce the break with solder, taking care not to burn the wire inside, which is the grid coil. The solder bridge makes a good place to connect the B+.) In essence, we have a push-pull TNT oscillator.

To decrease losses, I used a six-prong ceramic tube socket and mounted it on plexiglass. To tune



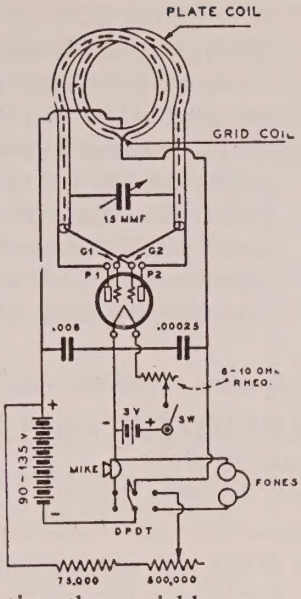
The "VHF" oscillator.



Going for "UHF."

the tubing, I employed an old Pilot seven-plate variable condenser. To avoid hand capacity, I made an insulated shaft from the phenolic body of an old Western Electric 70-type fuse.

With a B+ of 135 V, the circuit oscillated very well - the indicator bulb lighted brightly and I had to be careful not to burn it out. Plate current was 130 mA. With 18 watts' plate input, beware of TVI! My wife was doing bookwork at the kitchen table while watching television. Rotating the variable condenser, I heard my carrier on the TV speaker, then tuned for maximum shouts from the kitchen. Things got a little scary - I turned off the oscillator and the herringbones continued until we changed channels. Evidently the carrier shocked something in the TV into oscillation.



The output frequency at minimum capacity was 40 MHz, hardly UHF in today's terms. Reducing the condenser to three plates raised it to 45 MHz (6.66 meters). I could have wound the tubing on a larger form and spread the turns out more. I am sure the diameter of the coil, for the old five-meter band (60 MHz) is smaller in the original article.

Anyhow, I proved the point - the copper-tubing oscillator works quite well. One oddity was that at first it did not oscillate; I had forgotten to jumper the A- and B-. Using a jumper at the batteries, I had higher output than when connecting at the breadboard: RF in the power leads? Possibly chokes in the A and B leads would have cleared this condition.

A 400-MHz "MICROWAVE" OSCILLATOR

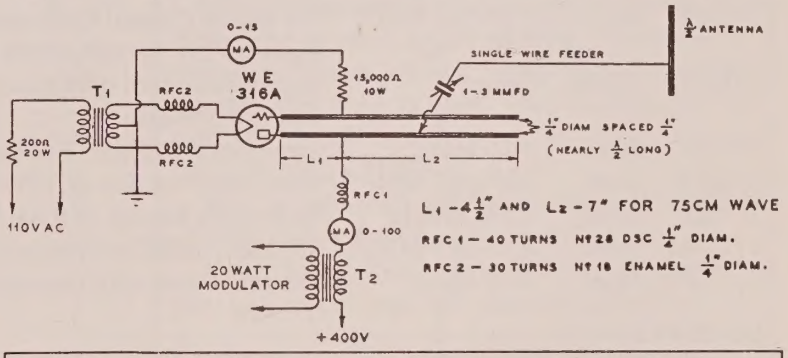
We all know that, from the beginning of radio communication, the usable limit of the spectrum was constantly pushed higher in frequency. As a teenager, sorting through sheet music in the piano bench I found a newspaper page dated 1919, 30 years before, on which was an article by E. F. W. Alexanderson. In it he expressed concern about the crowded radio spectrum and suggested replacing spark with the alternator and vacuum-tube transmitters, as well as using better receivers, but did not mention the possibility of using shorter wavelengths.

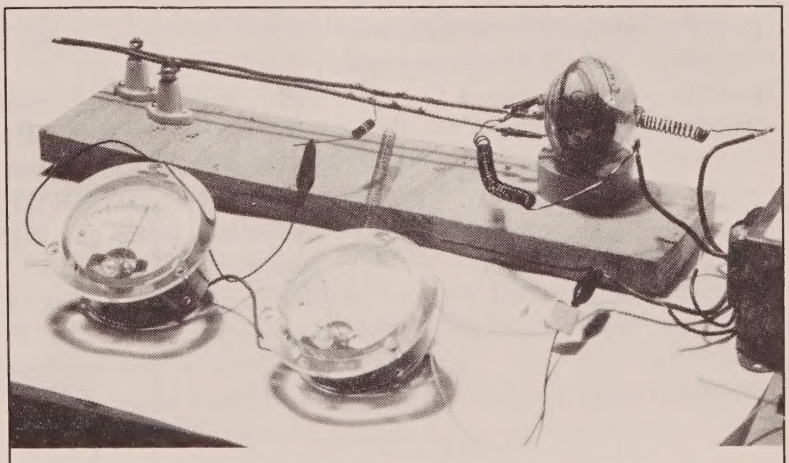
In the 1938 "Radio" Handbook, the region from 30 MHz to infinity was referred to as very-high or ultra-high frequency. Amateur bands were established up to 401 MHz. Wavelengths shorter than one meter were referred to as "microwaves."

At Bell Labs, Dr. Glenn Southworth was experimenting with centimeter waves in waveguide and the possibility of gigahertz microwave channels carrying network TV and multiplexed telephone channels was considered promising, as AT&T had 240-plus telephone channels working on an underground coax cable route between Philadelphia and New York by 1939.

For a "microwave" oscillator, I decided to build the parallel-rod oscillator on page 430 of the 1939 "Radio" Handbook. The first problem was to light the filament of the 316A tube (2.0 V at 3.65 A) from a 6.3-V transformer. A 300-ohm resistor in series with the primary gave the right voltage on the filament. Using copper tubing for the "tank" circuit, cut to the dimensions in the book, I ended up with a frequency of 308 MHz. With a plate voltage of 400, I_p ran 45 mA and I_g was 4 mA.

Cutting the rods to 10 inches raised the frequency to 408 MHz, reduced the output and made the plate run red hot. No amount of positioning the grid and plate leads helped; after all, we were only 92 MHz below the nominal limit of the 316A. A flashlight bulb on a multiturn loop would not light, but a neon bulb held close to the tank would; also, a volt-ohmmeter would deflect mysteriously when





The 316A "microwave" oscillator.

switched to a voltage range with the leads placed within a foot or two of the oscillator.

Deciding that maybe copper tubing was too low in Q, I made a tank out of two 11-½" lengths of 8- or 10-ga. copper wire. With a frequency of 308 MHz, I_p rose to 50 mA with an I_g of 10 mA. An improvement, yes. The flashlight bulb on the loop still would not light, but the neon lamp glowed more readily - indicating a stronger RF field. I guess the best bet would be good old #6 building ground wire, drilled in the ends for the tube pins and tapped for setscrews.

I do not know what specific equipment the 316A was designed for, but it was the first of a series of UHF "doorknob" tubes, each one being an improvement over the other and eventually reaching 1000 MHz. Renumbered VT-191, the 316A was used by the thousands as the 493.5-MHz transmitter in the BC-645 IFF set of WW II, a line oscillator similar to the one above.

MORE ON THE RAF T1154 TRANSMITTER - R1155 RECEIVER

Louis Meulstee, PA0PCR
Smetanalaan 28, 3122 HP Schiedam, Holland

I would like to add a few words to the *OTB*'s articles on the T1154-R1155 transmitter and receiver (Vols. 31, No. 4; 32, No. 1; and 32, No. 2 - Feb., May, and Aug. 1991). Some years ago I published a similar article, "RAF Aircraft Radio Installation T1154-R1155," in a Dutch magazine (of the Documentatiegroep '40-'45, Gravenhage, 1979) which might add some interesting details, for example the list of models shown below. Incidentally, in the late Sixties I repaired quite a number of R1155s, which were fitted in trawlers and coasters, the transmitter being a surplus U. S. airborne BC-375 modified for crystal control.

(A photo of a T1154 appears on the rear cover.)

Type	Case	Frequencies	Notes
TRANSMITTERS			
T1154	Alum.	3-10 MHz*	
T1154A	Alum.	Same*	For CW/MCW only.
T1154B	Alum.	Same*	For Halifax bombers.
T1154C	Alum.	2.35-16.7 MHz*	Coastal version, replaced by T1154F.
T1154D	Alum.	2.5-8 MHz*	Mobile ground stations; used with R1188 rcvr; repl. by T1154K.
T1154E	Alum.	Same*	Mobile ground stations; used with R1188 rcvr; CW/MCW only.
T1154F	Alum.	2.35-16.7 MHz*	For use by Coastal Command, in Sunderland, Halifax, and flight-trainer aircraft where weight was critical.
T1154H	Alum.	Same*	Improved system of channel setting. Standard type for Halifax and flying boats.
T1154J	Steel	3-10 MHz*	Steel-cased T1154B. For bombers of all types except Halifax.
T1154K	Steel	2.35-16.7 MHz*	Steel-cased version of T1154F. Replaced by T1154M.
T1154L	Steel	1.5-5.5 MHz*	Exclusively for use in RAF high-speed air-sea rescue launches.
T1154M	Steel	2.35-16.7 MHz*	Standard model with improved channel-setter, replacing T1154K.
T1154N	Steel	3-10 MHz*	Steel-cased set with improved channel-setter, nearly identical to T1154B.
RECEIVERS			
R1155	Alum.	75-500 kHz, 0.6-1.5 & 3-18.5 MHz	
R1155A	Alum.	Same	Filters built in for suppressing MF interference.
R1155B	Alum.	Same	Like "A" and "E," with HF radar-interference filters.
R1155C	Alum.	Same	HF direction-finder version, otherwise same as "A."
R1155D	Steel	Same	Steel-cased model of R1155.
R1155E	Steel	Same	Steel-cased model of R1155A.
R1155F	Steel	Same	Steel version of R1155B.
R1155L	Alum.	0.6-18 MHz*	Exclusively for RAF high-speed air-sea rescue launches.
R1155M	Steel	Same as R1155	Steel model of R1155A. Produced with corrosive-core solder; restricted to "non-flying ground schools."
R1155N	Steel	0.6-18 MHz*	Steel-cased model of R1155L.

* Also 200-500 kHz.

TECH-MANUAL ART - A CANADIAN VIEW

Source material from **Chris Bisaillion, VE3CBK**
1324 Old Carp Rd., R. R. No. 1, Kanata, Ontario K2K 1X7, Canada

"Tech-Manual Art" (*OTB*, Nov. 1992, p. 47) showed some examples of cartoons in U. S. military technical manuals from early in WW II. The story drew comment from Chris Bisaillion, VE3CBK, with some background focused on Canadian manuals.

In particular, the syndicated newspaper cartoonist, "Ting," did military work at the time, drawing the figures in the manual for Wireless Set No. 52 and about half the artwork in the 1944 book for "Antennae Vertical 34' Steel Mk 1." They are reprinted herewith.

Some of the smaller figures from the antenna manual show a bunny-rabbit, semi-hidden. Ting explained that military cartoonists were not allowed to sign their names to their work, so they substituted animals for signatures. He didn't do this until later, when he introduced a character called "Luke Worm," a signature to this day.

Chris interviewed Ting at "Humour Under Fire," a special open house of war cartoons at the Canadian Centre for Caricature. This is a small museum in downtown Ottawa, part of the National Archives of Canada [136 St. Patrick St., (613) 995-5138, open every day, 10 AM - 6 PM, and until 8 PM on W-Th-F].

TING BIOGRAPHY

Merle Randolph Tingley was born in Montreal. Hardly anyone calls him Merle Randolph: he's affectionately known as "Ting."

Ting graduated from Montreal High School, but his editor says he can spell anything but words. That's why he draws pictures for a living - and has become pretty good at it.

He did take an art course, but left after one year to become a draughtsman. That career was short-lived when he doodled a worm into a building plan. Apparently engineers don't like worms in foundations of their solid structures. (Today, "Luke Worm" appears hidden in all of Ting's cartoons and readers of all ages enjoy the daily challenge of unearthing the little critter with the corncob pipe.)

With Hitler on the warpath, Tingley joined the army in 1942. Shortly after, His Majesty's Canadian Forces were looking for a cartoonist to enhance the army magazine *Khaki*. Ting got the job. Later he transferred overseas to serve on the forces daily *The Maple Leaf*.

The art department of an advertising agency picked him up after the war, but the cartoon bug had bitten and you can't have much fun with beans, soap and deodorants. Hitting the road on a second-hand motor bike, he visited newspapers from coast to coast, but to no avail. The would-be cartoonist took a job as a photo-retoucher at *The London Free Press* in 1947. Two months later he wormed himself into the first *Free Press* cartoonist's job. He's still there.

Ting cartoons are now syndicated to a number of daily and weekly papers across Canada.

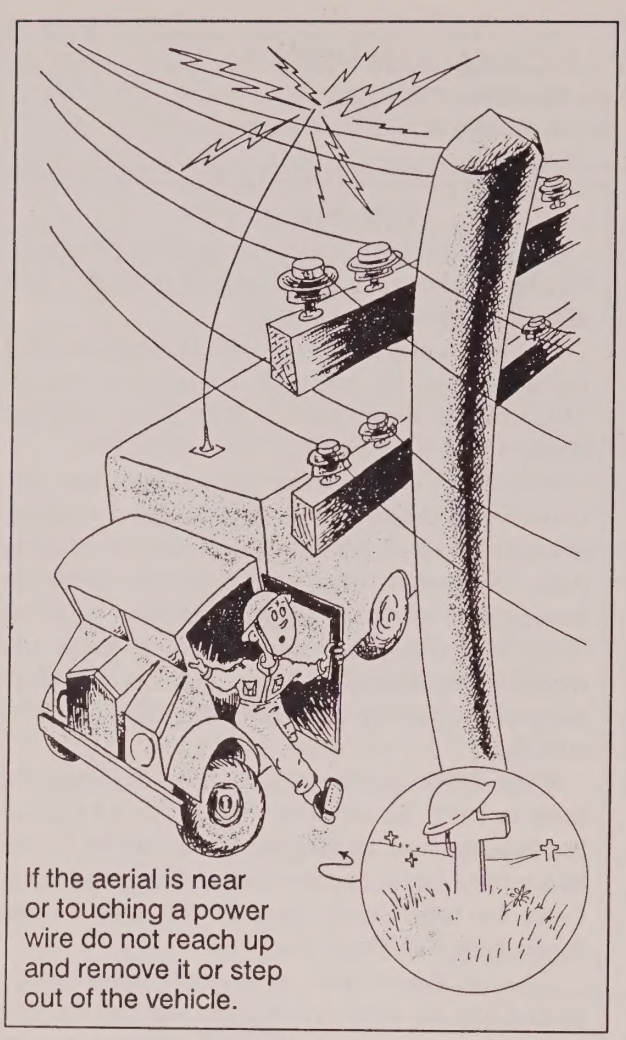
Never having lost his ties with the troops, Tingley has entertained our peace-keeping forces in Korea, the Mideast, the Congo, Cyprus and Europe. Added to this are two missions to the Pacific and the Far East sponsored by the American government.

Among his laurels are 15 national and international awards, including five for humorous writing, two children's books and nine volumes of his *Free Press* cartoons.

As a designer for London's fantasy park, Storybook Gardens, Ting has been on the advisory committee since its inception in 1958.

Merle Randolph Tingley has one wife, Genie, two sons, two cats, and a dog, and of course, Luke Worm.

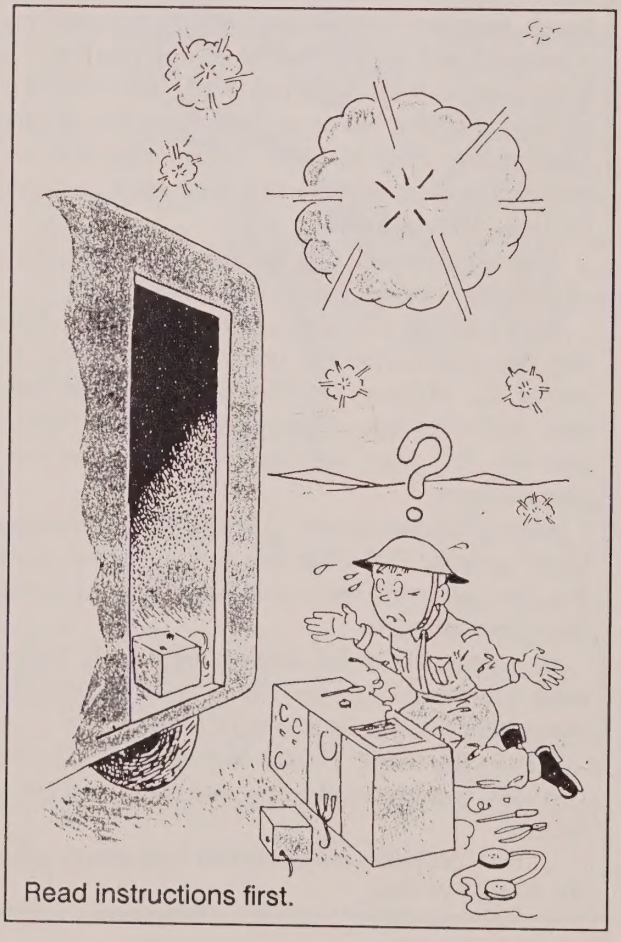
. . . from the Community Relations Department, *London* (Ont.) *Free Press*



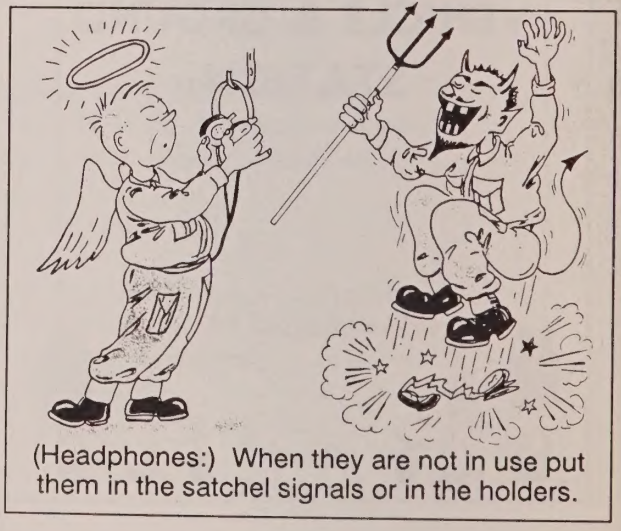
If the aerial is near or touching a power wire do not reach up and remove it or step out of the vehicle.

Avoid dead spots.

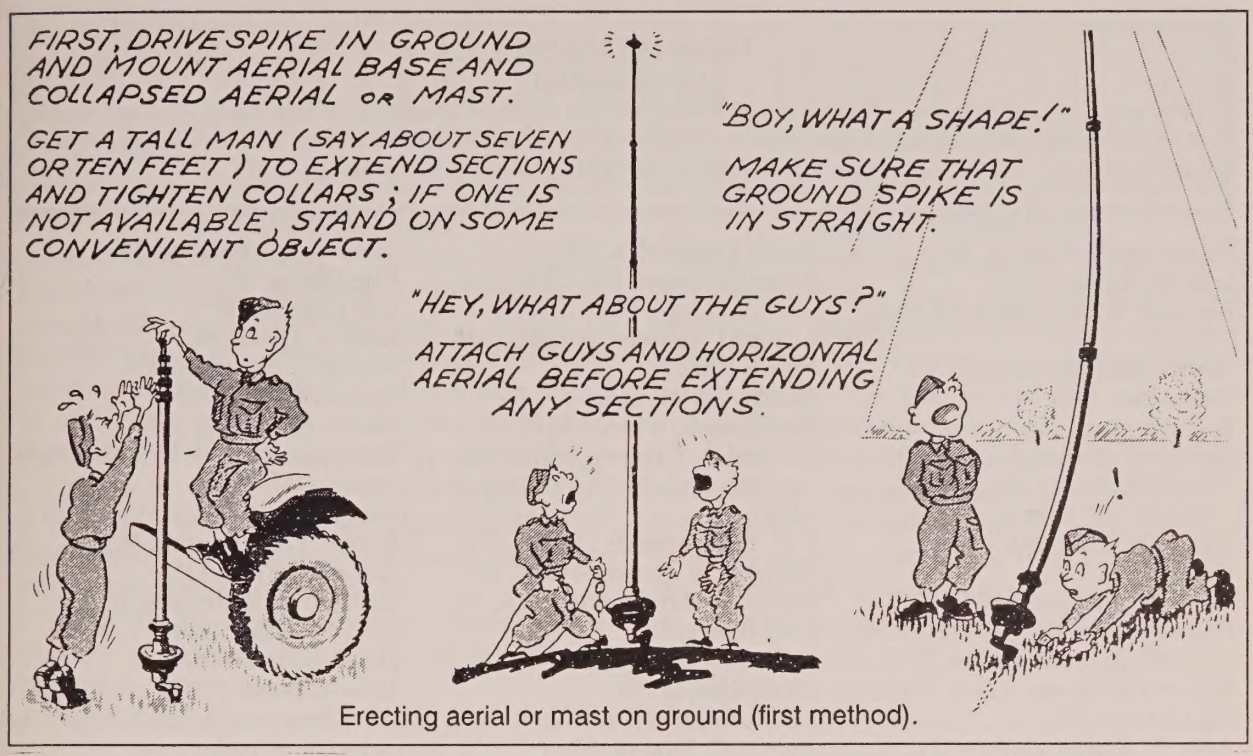
. . . and be sure to replace the lockwashers.



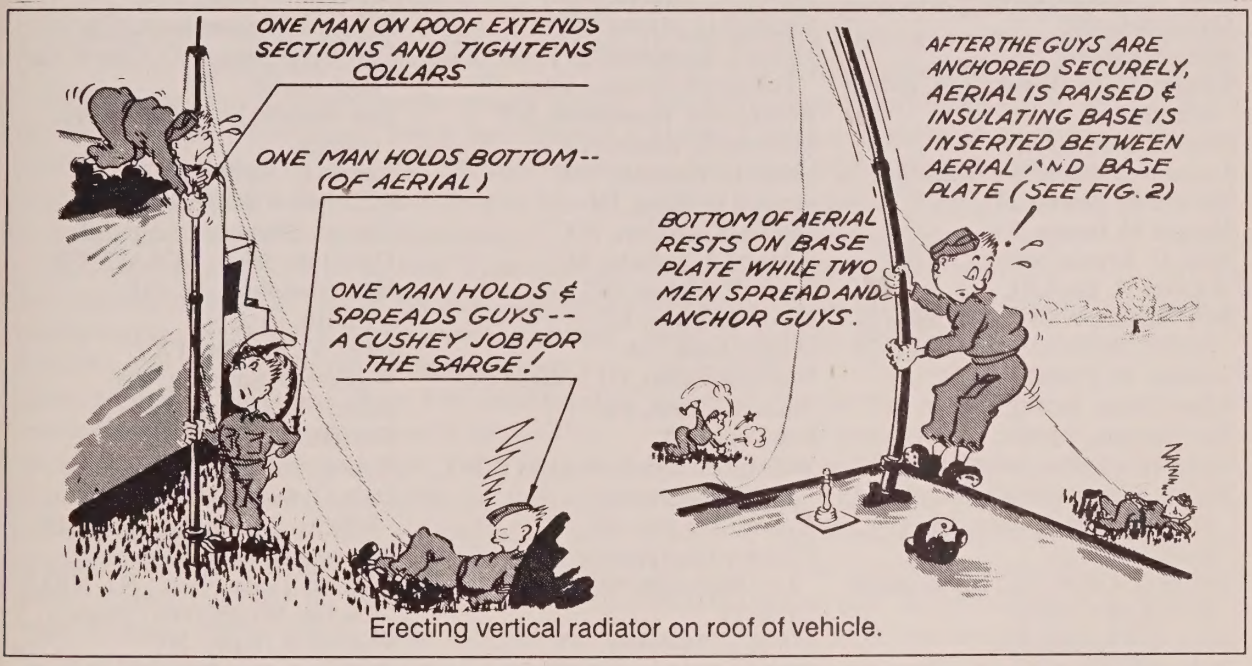
Read instructions first.



(Headphones:) When they are not in use put them in the satchel signals or in the holders.

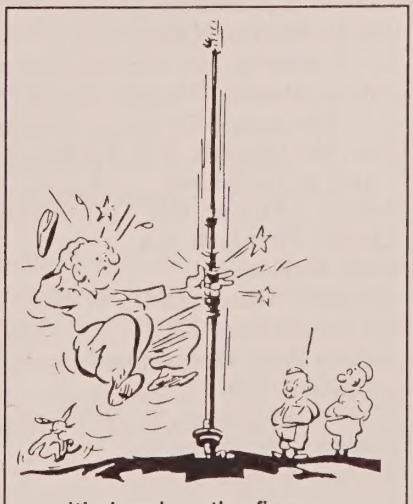

FIRST, DRIVE SPIKE IN GROUND AND MOUNT AERIAL BASE AND COLLAPSED AERIAL OR MAST.
GET A TALL MAN (SAY ABOUT SEVEN OR TEN FEET) TO EXTEND SECTIONS AND TIGHTEN COLLARS; IF ONE IS NOT AVAILABLE, STAND ON SOME CONVENIENT OBJECT.
"HEY, WHAT ABOUT THE GUYS?"
ATTACH GUYS AND HORIZONTAL AERIAL BEFORE EXTENDING ANY SECTIONS.
"BOY, WHAT A SHAPE!"
MAKE SURE THAT GROUND SPIKE IS IN STRAIGHT.

Erecting aerial or mast on ground (first method).

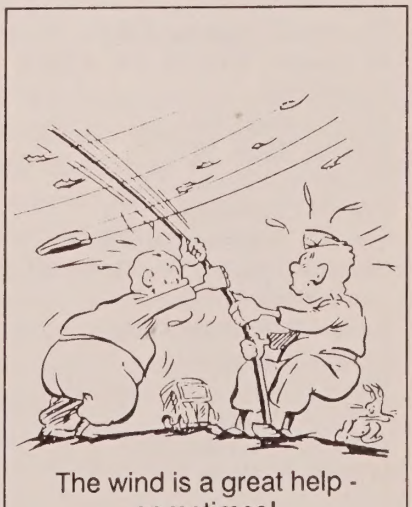

ONE MAN ON ROOF EXTENDS SECTIONS AND TIGHTENS COLLARS
ONE MAN HOLDS BOTTOM-- (OF AERIAL)
ONE MAN HOLDS & SPREADS GUYS -- A CUSHEY JOB FOR THE SARGE!
BOTTOM OF AERIAL RESTS ON BASE PLATE WHILE TWO MEN SPREAD AND ANCHOR GUYS.
AFTER THE GUYS ARE ANCHORED SECURELY, AERIAL IS RAISED & INSULATING BASE IS INSERTED BETWEEN AERIAL AND BASE PLATE (SEE FIG. 2)

Erecting vertical radiator on roof of vehicle.

Don't get your guys tangled.



It's hard on the fingers.



The wind is a great help - sometimes!

NEW MEMBERS

Joyce Peckham

AWA welcomes the following new members. We list all new members routinely - if your name does not appear within six months after joining, please advise the Editor. If you do not wish to be shown, just mark the application form accordingly. AWA does not provide an address list or other directory of its membership.

Victor **Abell**, W9RGB, IN
Lyle W. **Ahrens**, OR
Kenneth W. **Anderson**, KK4DQ, NC
Mark **Anderson**, N2SUE, NY
Don **Avsec**, OH
Steve **Bagozzi**, CA
Robert W. **Baker**, KB7PSB, OR
Wendel S. **Baker**, K2LZF, NY, Harris - RF Comm.
Alfred W. **Balk**, NY
Rob **Barnes**, CO
William **Bartkavage**, OH
Charles L. **Bartlett**, WB2BQY, NY, USAF radio tech. 1968-72
Richard H. **Bauer**, K5RB, TX
Paul **Becker**, TN
John W. **Belille**, K9WOV, IL
David **Belt**, NY
Marc **Bergman**, CA
Edward H. **Berkowitz**, CA, patent attorney
Peter S. **Beyer**, AZ
Lance S. **Borden**, WB5REX, TX
Kristan K. **Bowne**, NJ
Joseph M. **Brady**, PA
John H. **Bravis**, W0EKS, MN
William H. **Burkett**, AZ
Bob **Burton**, W8WO, MI, news director, WOOD-AM-FM, 1972-79
Tommy W. **Callahan**, TX
Mike **Camp**, KI7FQ, CA
Jim **Cermak**, KB9CK, IL
Laird H. **Chaffee**, WV2HJK, NY
Earl L. **Clark**, K8BHP, MI, WW II submarine radioman - fleet boats
James C. **Clark**, AZ, cameraman, WTOC-TV, 1970
Ross G. **Clayton**, AL
Robert L. **Coats**, IL
Charles A. **Coderre**, CA
Ed **Cooper**, W3UVG, PA, KDKA
Darryl's, FL
Ralph J. **Day**, WA
Don M. **Diers**, WI
Robert W. **Downs**, TX
Ronald C. **Eisenbrey**, TX
Thomas T. **Ellsworth**, PA
James W. **Farley**, PA, GM/partner, WMKX-FM
Robert B. **Farnam**, WA
Richard **Farris**, NC
Wm. J. **Ferren**, OH, elect. tech.; USN - retired
Theodore A. **Fine**, NY
William F. **Fitch**, PA
David **Fitzpatrick**, TN
Robert **Frieden**, PA, Communications Dept, Penn State U.
Leonard **Gardner**, W2QBC, NY, U. S. Navy
Randy **Gayler**, GA
Walt **Gesell**, WD9DYR, IL
Clifford A. **Glaspey**, WA, radio repair, ex-Army & Vocational Ed.
F. F. **Greetham**, Jr., K2KK, NY
Herman W. **Gross**, W9ITT, IN
James G. **Harris**, WB2HWR, NJ
Don **Henry**, PA
Michael P. **Hiza**, CT
David **Hofeld**, NJ
Michael **Horner**, CA
Robert C. **Hysted**, FL
Richard G. **Hypes**, NC
James I. **Kaminski**, NY, 1st Class Telegraph licensee since '59
Bernhard J. **Kammann**, NY
Michael R. **Keefe**, NY
Lloyd D. **Kendall**, VA
Russell G. **King**, IN
Msrtin **Kornblatt**, NY
Edward S. **Janicki**, MI
Cecil D. **Joyner**, NC
David R. **Lane**, KS
Magne **Lein**, CA
Nicholas **Lesso**, NJ, retired EE
Thomas **Lewis**, FL
Fay **Lock**, NY
William B. **Lynch**, WA2PXY, NY, physics instructor
Robert E. **Lynn**, NJ
Charles **MacQuarrie**, CA
Lou **Mahalak**, W8VU, CA, USCG
James F. **Maloney**, NY
Ronald L. **Manning**, TX
Jim H. **Martin**, NY
Jim S. **Martin**, SC
John J. **Martin**, CA
J. R. **McCann**, MO
Paul **McDonough**, MA, EE student at Tufts Univ.
Melba S. **McGee**, OK
Dan R. **McIntosh**, CA
Kelly **McKee**, AR
Ernest F. **Meade**, KJ8E, WV
Melton **Mobley**, TX
Jensen Reitz **Montambault**, KC4GPZ, VA
C. A. **Montgomery**, Sr., WY
Joseph C. **Mulcare**, IL
Robert H. **Mullis**, VA
James L. **Nicholson**, CA
Roy **Oberg**, MI
Lee **Olzenak**, NY
John A. **Owen**, NC
Nelson C. **Peloquin**, PA
Ronald **Pfeffer**, NY
Joseph M. **Pregio**, CT
Giuseppe **Rasicci**, IW6MUF, Italy, radio-TV repair
Ken **Reitz**, KC4GQA, VA
Robert L. **Richmond**, MI
Justin M. **Riem**, ON
Richard A. **Rodriguez**, IL
John **Ruccolo**, KB2NYY, NJ
Jim **Russo**, N1MAA, RI
John T. **Salva**, NY
Abel **Santoro**, LU8DXI, Argentina, electronic tech.
Robert L. **Schoenbeck**, CA
Curt **Schreiber**, MO, Ozark Vintage Radio
Sam **Seldon**, IA, Seldon Electronics
Joseph E. **Selkregg**, CA
R. Stephen **Seufert**, NH
Charles **Sheridan**, England
Theodore **Silva**, KD6AIP, CA
John **Slaughter**, IL, GE
J. **Smith**, FL
Janet M. **Snyder**, TX
William B. **Sonntag**, VA
Robert E. **Spidell**, CA
Raymond g. **Stefurak**, NC
Robert **Sukosky**, CT
Dale G. **Svetanoff**, WA9ENA, WECo, Zenith, Lindgren RF
Wayne A. **Tesch**, MN
Richard **Titus**, NV2C, NJ, NRI/-Curtiss-Wright/GE/Thiokol
William P. **Tully**, NY
George S. **Van Dyke**, Jr., PA
Giovanni **Verrienti**, Italy
John F. **Vogel**, III, CA
Eugene K. **Warner**, CA
Harry F. **Wasmundt**, WA, FCC 1940-45; FAA/CAA; US Navy 1936-40
Russell **Wasserman**, KXN2429, WI
Byron R. **White**, KE5XU, TX
C. Bart **Whitehouse**, CO
Lawrence R. **Wienhoff**, KB0AKW, IL
Chris **Williams**, ON
Lance G. **Wilson**, AZ
Leland A. **Winfrey**, W0JEQ, NB
Jim **Woody**, VA
Lloyd H. **Yost**, NJ

THE MAILBAG

Readers' comments on early radio topics are welcome. Because of space limitations, letters that are published may have to be edited. Send all material to the Editor.

MODERN RADIO LABS

I have been one of MRL's "fans" for many years. One correction [to the story in the Feb. *OTB*]: some MRL plug-in coils were wound directly on the tube bases - no additional material. I have one set of same (four-pin), N. I. B. These were a work of art. Very thin strips of different-hued paper were cemented around each coil for color coding.

I have a set of the five-pin coils, a long-wave and a broadcast-band coil, and an original "QRM coil." The owner of Antique Audio in Austin, Texas has an original MRL one-tube set.

The MRL No. 2 crystal set would indeed get decent DX. I received over 1500 miles on mine way back when! **Dick Mackiewicz**

(Dick wrote the recent MRL feature in the "NEARC Escutcheon," as reprinted in the Winter 1992 issue of the "ARCA Gazette." - Ed.)

WQXR-AM → WQEW

I must take firm exception to the remark made by Bruce Kelley ("In-House," Feb.) that "little is lost" by the demise of WQXR-AM. He makes this claim because WQXR-FM will continue to broadcast the same material as its defunct sibling.

To those of us who lived in New York or who love classical music the loss of the AM [outlet] is nearly tragic. WQXR-AM was a powerful station (50 kW) and could be heard at night in many regions, especially hilly areas where FM could barely be received. It was the only source of classical music for people who grew up in New York, and now live elsewhere. Listening to WQXR on 1560 kHz at night brought back a world of intelligence and sophistication. The station's announcers were superb. I miss the old and recent ones - Jacques Frei, Duncan Pirnie, Lloyd Moss and June LaBelle. Programs like "Cocktail Time," "The Vocal Scene," "The Listening Booth" and "Symphony Hall" are gone from my life. The new station on 1560 kHz carries the same insipid "golden oldies" that one can hear elsewhere on the dial. WQXR-AM was unique. Shame on the station's owner, the *New York Times*, for betraying a loyal following. **A. David Wunsch**

The transfer of the WQXR-AM facility brings winners and losers. In the New York metro area, the spectrum waste of simulcasting on AM and FM is now gone. Local listeners gain a program source, via WNEW's new business-news format and migration of WNEW's old format to WQXR-WQEW. By contrast, classical-music listeners in WQXR's nighttime skywave coverage area lose out. New times: FM is king, and AM is expendable - Ed.

COLOR CRT INVENTION

I found Edward Herold's article, "A Footnote on an Important Color Tube Invention" (*OTB*, Nov. 1992) of real interest, partisan though it was. During the period 1937-74 I was a member of Philco's Patent Department and viewed the controversy from a different perspective.

I knew Philco's inventor, John W. Tiley, very well. He was an exceptionally able engineer. I find it difficult to believe that he could have derived his invention directly or indirectly from any other party, and still have filed with his application the required sworn oath that he believed himself to be the "original, first and sole inventor" of the subject matter claimed.

But I wish particularly to comment on the article's remarks regarding William E. Bradley, an old friend whom I have known since 1937. His testimony was sorely misjudged by both Herold and Federal District Court Judge Lane. Bill Bradley, a former Director of Research at Philco, is not only a scholar and a gentleman, but also a top-notch engineer and scientist. Perhaps unusual for an engineer, he possesses great mastery of the English language. In these areas he would not require the assistance of "Philco's counsel and a Ph. D. in English." I am not surprised that his testimony was deemed "letter perfect in every sentence," nor am I surprised that he was able to recite "events of 15 years before in great detail." Remember that this case was tried in Federal District Court on appeal by RCA from the U. S. Patent Office, where the Board of Interference Examiners (all technical experts) had ruled in favor of Tiley (Philco). Bradley testified in that case, so the facts were by no means new to him when he appeared before Judge Lane. Judge Lane clearly misjudged Bradley when he concluded that "much of his testimony is unworthy of belief."

Determination of priority as between competing inventors is often difficult. That is beautifully illustrated by a historic decision of the U. S. Supreme Court which, in another case arising in the U. S. Patent Office, found Alexander Graham Bell to be the first and true inventor of the telephone. The seven justices on that occasion split four to three in favor of Bell. Four concluded that Bell was the true inventor, and thus he was awarded his patent No. 174,465 on the telephone. But the three other justices (presumably equally qualified) concluded otherwise; they would have awarded priority, and hence the patent, to a Pennsylvanian, Daniel Drawbaugh! **Bill Denk**, W3IGU

RECENT RADIO AND ENTERTAINER OBITUARIES

Charles Griffen, W1GYR
1225 New Britain Ave., West Hartford, CT 06110

Major John Brown, G3EUR, designer of the British wartime MCR-1 "Woolworths" communication receiver (*OTB* Vol. 31 No. 4) and other gear for *sub rosa* uses in WW II.

James Caldwell, 92, "oldest and fastest" member in the Philadelphia chapter of the Morse Telegraph Club. Telegraph operator at age 16. As AT&T cable tester, he performed acceptance testing on the new Harrisburg-Pittsburg "A" cable in 1920. Held a wide variety of non-electronic jobs diring his career.

Lincoln Dellar, 85, president of Lincoln Dellar & Co. Hired on in 1932 as general manager of KGB, San Diego. He built several stations in California after WW II, retired briefly in 1958, and bought other California stations.

John C. Doerfer, 87, one-time FCC chairman. Appointed to the Commission in 1953, he became Chairman in 1957; resigned in 1960 amid rumors he had accepted gratuities from broadcasters.

Otis S. Freeman, 71, early television engineer. He started with the Allen B. Dumont Laboratories and its station W2XWV (now WNEW-TV); became Director of Engineering of Tribune Broadcasting Co. and Senior Engineering VP, WPIX, New York.

Reginald J. Iversen, K4QZ, 93, WW I Navy radioman; designer of the transmitter for Admiral Byrd's 1929 trans-Antarctic flight and equipment for other explorers; later manager of the radio communications and recording departments of the *New York Times*.

Robert E. Moe, 80, GE engineer. He was Manager of Engineering at the Owensboro tube plant, 1949-64. In 1962-67 he was a member of the U. S. delegation to the International Electrotechnical Commission, which sets electrical-electronics standards.

Joe Gratz, 76, radio-TV broadcaster. Joining CBS Radio in 1936, he went on to CBS TV and also involved with stations in Omaha and Florida.

Richard Salant, 78, former CBS News president. He supervised introduction of the "CBS Morning News" and "60 Minutes."

John Murphy, 79, president of AVCO Broadcasting Corp. (formerly Crosley Stations Inc.) in 1963-78. He started with NBC in 1930. He jointed Crosley in 1948 as GM of WLWD (TV), Dayton.; became president of AVCO in 1963.

David B. Smith, 81, retired Philco engineer. Joined in 1934. Appointed research director in 1939, he led the company's radar/IFF program in WW II; later became engineering VP for research and engineering. He served as member of the first National Television Systems Committee (B & W) and as vice-chair of the second NTSC (color). Fellow of the IRE, 1948; of the AIEE, 1955. Retired from Philco-Ford in 1967 and became president of HRB-Singer. Later taught at Drexel University; wrote and edited textbooks.

Mary Rines Thompson, 74, president until 1983 of Maine Broadcasting System, Portland, ME. Her father, Henry Rines, in 1925 built WCSH, the first radio station in southern Maine.

John Spence Timmons, 99, '20s loudspeaker manufacturer and designer of the "Timmons Talker." After acquisition of his company by Philco in 1928, he managed production of speakers and transformers, becoming vice president of the refrigerator division. Retired from Philco in 1956.

Samuel Willard Townsend, early broadcaster. He began as Assistant Chief Engineer, WADC, Akron, OH, in 1925. He built the transmitter for goat-gland doctor John Brinkley's KFKB in Milford, Kansas; was involved in operation and ownership of several other radio and TV stations until 1961.

Jackson Weaver, radio personality. Began in radio in 1934, and was heard on Buffalo stations WBEN, WBNY, and WKBW. Part of the "Harden & Weaver" show on WMAL, Washington, since 1960.

Thanks for contributions to Paul Bohlander, W3VVS; J. W. Dreher, W2TKG; Bill Fizette, K3ZJW; George A. Freeman; Pat Leggatt; Charles T. Mooney; Bob Morris, W2LV; and Howard Passel.

SILENT KEYS

(AWA members, with or w/o radio licenses)

Harold H. Beverage, 99, ex-2BML, inventor of the Beverage wave antenna used in the 1921 amateur transatlantic tests, head of radio research for RCA for many years, holder of 41 U. S. patents, 1937 president of the IRE, IEEE Fellow and recipient of the IEEE Medal of Honor, holder of the Pioneer Award of the Radio Club of America.

William L. Compton

Otto N. Geyer

Joseph Horvath, W6GPB, member since 1970.

Francis C. MacQueen

Henry W. McLaughlin

Rodney Melhuish, W3KKY, member since 1966 and demonstrator, with Bruce Boyd, W3QA, of a freshly built arc transmitter at the 1974 Conference.

Murray Shapiro

Joe Szabat, W3LST

Clive Taylor, VE3CL

CLASSIFIED ADS

Old-time ads are free to members collecting and restoring equipment for personal use. **The rules:** (1) one ad per issue per member; (2) include an SASE if acknowledgement is desired; (3) material must be over 25 years old and related to electronic communication; (4) give your full name, address, and ZIP code; (5) repeats require another notice - we aren't set up to repeat automatically; (6) the Association is not responsible for **any** transaction; (7) we retain the right to reduce the size of the ad if over seven lines; (8) AWA does not accept commercial advertising; (9) deadline for ads in the August issue is June 9; those received later will be held for the following issue. Mail **all** ads to: **Richard Ransley, Box 41, Sodus, NY 14551.**

SELL/TRADE - BC/SW TUBE RADIOS

Radiola 20, Crosley XJ, Columbia XII, Splitdorf R-V-695, Thorola 4 horn, Thorola Islodyne, Midwest MIRACO Unitune, Dictograd horn, Philco 60, Browning-Drake 3-tube breadboard, AK-185A. Richard A. Botzum, RD 2 Box 419, Morgantown, PA 19543, (215) 286-0047.

Atwater Kent 20C battery set, $100. Charles Freshman battery set, built-in horn, works, $150. Both have been restored; priced w/o tubes and less shipping. Rick Parrish, 1260 Marilyn Dr., Cape Girardeau, MO 63701, (314) 334-1726.

Magnavox Belvidere console, solid oak, AM-FM, refinished. Mint cond. Photos available. John Connelly, PO Box 64, Matteson, IL 60443, (708) 720-9058.

Bright red AU 190 Emerson Catalin for best offer. Send $2 for set of photos. No chips or cracks. Orig. cond. (unpolished). Plays good; line cord frayed but works. Will not ship but can bring to most radio meets within 500 miles of Buffalo, NY. Larry Babcock, 8095 Centre Ln., E. Amherst, NY 14051, (716) 741-3082.

Cabinets only - RCA Radiola 30 and 28. Nice cond. Would sell to someone having chassis components or would buy your components to make complete sets. Also selling reprint of Radiola 28 instruction book, 30 pages, $12 ppd. reprint National NC-46, NC-57 books, $12 each ppd. Gary Micanek, 226 Henry Ave., Manchester,MO 63011.

Moving out of state. Entire collection of console, table radios, parts, tubes and test eqpt sold as a lot. Pick up only; no cherry-picking, no list. Dick Haynes, 12511 S. 83rd Ave., Palos Park, IL 60464.

Classic peanut-tube sets: Northern Electric R-4, Mercury Super 10. Also Addison Catalin. A. R. Nolf, 529 Kastelic Pl., Burlington, Ont., Canada L7N 3S9, (416) 333-4557.

Trade mahogany De Forest D-12 with loop antenna for CR-series Grebe, Federal, Kennedy or Paragon sets. Phillip Drexler, 1175 E. Ripley Ave, St. Paul, MN 55109, (612) 771-8620.

1942 Capehart, Model M2 FM. Edward H. Leonard, 184 Holden St., Holden MA 01520, (508) 853-4524.

Brunswick-Collender Panatrope radio-phonograph, the instrument owned by the rich in the mid-20s, in exc. cond.. Send SASE with $1 for detailed information and 3 photos. Harry Stavert, 7231-68th Ave N.E., Marysville, WA 98270.

Radiobar - Philco, electronically complete. Cabinet in exc. cond.. Bar is complete with 6 each of shot, cordial, highball and sour glasses, 4 liquor decanters - all perfect, $1500. Kevin Murphy, PO Box 762, Arnold, MO 63010, (314) 353-5933.

McIntosh preamp C108, McIntosh power supply D101, Heathkit amp Model W-5M; NIB RCA 810 tubes $75 each; Philco 87 console restored; Philco 90 cathedral, restored. Keith Park, 795 Grooms Rd., Rexford, NY 12148, (518) 373-0417.

SELL/TRADE - COMM GEAR

National NFM-73B 2-tube NBFM adapter, plugs into NC-173 rcvr, w/ instructions & tech sheets, $15 ppd. RCA WG-290 high-voltage (30-kV) probe usable with any VTVM or VOM w/ instruction book, $10 ppd. Ken Greenberg, 4858 Lee, Skokie, IL 60077, (708) 679-8641.

FU-40 foundation kit for 40-watt CW xmtr from Burstein-Applebee (see 1948 11th ed. Radio Handbook). 6AG7-6L6-807 and BC-610 plug-in tuning unit. All parts to complete unit, tubes and one new TU-53 included. Write for photo and info., $50 plus UPS. Neil Spencer, W4PC, 4665 75th Ave., North Pinellas Park, FL 34665.

Marconi 394G ship's rcvr, offers; VG/exc. cond. w/fitting & operation instructions and letters. Quote from 1967 Marconi Marine letter: "This piece of equipment may well become a valuable

museum piece." Clarence Harriman, 1 Clover Ln., Bradford, MA 01835.

National NC-300, Philco 37-690, Realistic DX-160, DX-300, STA-64B, 31-2081, Emerson PM-3915, Columbia C-611, GE C438B; all parts to build kW linear amps. F. H. Yonker, W2IBH, 1229 Inverary Place, State College, PA 16801, (814) 867-1400.

Trade only - plug-in coils: 11 sets for SW-3, 1 set for Pilot Super Wasp, misc. for FB-7 & AGS. Want Grebe CR-18 coils, Radiola IIIA P-P audios & cabinet, Hammarlund MC-B dual bandspread, bandset midget cond., ARRL pub. "How to Become a Radio Amateur" 1933, '34 & '35, and WD-11-to-UX tube adapters. Charles Byrnes, 1201 Sycamore Terrace, No. 102, Sunnyvale, CA 94086.

SELL/TRADE - GENERAL

Big auction, flea market, and dinner at AWA Spring Meet, May 1, Bloomfield, NY. See notice on page 4 for lunch reservations.

Ameco code-practice oscillator; battery-set battery eliminator, $10 each; Southern States (same as SRIA) #572-21 AM-BC $20; GE Model 50 clock radio, $10; Heath HMTS standing wave meter, $10. James Looney, RT 1, Box 54, Grundy, VA 24614-9705.

Stock certificates: Baird TV Ltd. (1936) - John Baird, developer of mech-scan TV in 1928. Limited qty., $60 ppd. Other certificates; write for list. J. J. Papovich, 53 Magnolia Ave., Pitman, NJ 08071, (609) 582-8279.

SELL/TRADE - LITERATURE

British valve & wireless publications and ephemera 1925-60. Early Magnavox R3B base/driver; several battery sets. 10-page list, 58¢ in loose US stamps. Roger Hart, 4533 Harvard Ave., Montreal, Que., Canada H4A 2Y3, (514) 483-3857.

AWA Review, Vols. 1, 2, 3, 6, 7: $12.50 ea. ppd. in N. America. A word to the wise: 1, 2, and 3 are running low . . . AWA, 44 E. Main St., Flemington, NJ 08822-1224.

Allied "Radio Circuit Handbook," 1945, $8; Allied "Radio Builder's Handbook," 1944, $8; 1954 Sams Video Handbook, mint, $8; Ghirardi 1941 Radio Troubleshooters Handbook, $28; 1926 vols, ($13 ea.) of Design of Electric Machines, Distribution of Electrical Energy, Electric Currents; later volumes: Hoag Basic Radio, $13; Jordan's Fundamentals of Radio, $13; Marcus & Levy's Elements of Radio Servicing, $13, Sams' 100-425 $3.50 ea., Rider's 4, 8-13, $13 ea. SASE for full list to Don Merz Book List, 47 Hazel Dr., Pittsburgh, PA 15228, (412) 344-0956 (7-10 PM Eastern).

Riders 8, 14, $24 ea. ppd.; "McGavren-Guild Radio," gift box of old radio commercials from 1920s thru 1980. Four sides of audio cassette tapes. Boxed set is entitled "A Gift to the Friends of Radio." No literature, just a neat set of tapes, $18 postpaid. Robert Hartje, 87 Newton St., Staten Island, NY 10312.

Sell/trade Rad Lab duplicates: Vols. 6, 9, 11 in first ed.; Vols. 3, 10 in second ed.; $30 ea. Need Vols. 1, 2, 5, 6, 10, 12, 13-17, 19, 21 in first ed. only. Sell Tesla 1903 book $225. Lawrence Larsen, 308 Hamilton Hwy., Silver Spring, MD 20901.

Old-time radio shows on tape cassettes. Catalog listing nearly 5000 shows arranged by category and title, $2. Herbert Parsons, Jr., PO Box 2284, Peabody, MA 01960.

Schematics: 1920-70 radio, ham, TV, electronic organs, test gear, Canadian, misc., $5 ppd. For quotes on manuals, send SASE. "If I don't have it, you probably don't need it." Alton Bowman, 4172 East Ave., Canandaigua, NY 14424-9564.

First user-friendly circuit on early BC-348s, most component values on 2 sheets 8 x 14, reads left to right, $2 plus (2) 29¢ stamps. Ray Larson, 12241½ Gorham Ave., W. Los Angeles, CA 90049.

Book QTC (I Have a Message for You), reviewed in *OTB* May 1991, p. 47: Sorry, hardcovers all sold, but paperback still available. Write Sequoia/KA5HCX, 2502 Cockburn Dr., Austin TX 78745, (512) 442-1311.

All-new crystal-radio price guide. 230+ listings of common & rare sets compiled by collector from results in auctions, classified ads, dealer & collector sales in recent months. $5 + 52¢ on large SASE. Dick Kowalski, KB8MR, 32823 Gloede Dr., Warren, MI 48093, (313) 294-6831.

Don C. Wallace, W6AM, Amateur Radio's Pioneer (list $29.95), $25.50; Crystal Clear (list $39.95), $34.50; 70 Years of Radio Tubes and Valves (list $25.95), $22.50; Fifty Years of Radio - 1938 *Radio-Craft* reprint (list $15.95), $13.50. Shipping (USA) $2.50 for first book plus $1 for each additional. SASE for list. Curt Schreiber, 3923 East Latoka, Springfield, MO 05809.

SELL/TRADE - MILITARY

Trade Japanese field transceiver for other foreign military rcvr. Charles D. Newcomer, 100 Central Manor Road, Mountville, PA 17554.

SELL/TRADE - PARTS

NOS and used radio repair parts, tubes, service data. Write wants and SASE. Old QSL cards, 5 for $2 postpaid. Frank Krantz, 100 Osage Ave., Somerdale, NJ 08083.

Knobs: Custom-molded plastic. Send knob to be duplicated plus $8 ea. for plastic, $12 ea. for imita-

tion wood or Catalin. Custom-formed plastic dial lenses. Send old lens, if possible, tracing of lens opening plus $15 each. L. Wade Terrell, 7109 E. Arbor Ave., Mesa, AZ 85208, (602) 830-7849.

Grille cloth for 1930s radios. 29¢ LSASE brings you actual cloth samples of 1930s reproduction grille cloth - as good as the originals. Twelve patterns available, others in production. Michael Katz, 3987 Daleview Avenue, Seaford, NY 11783.

SELL/TRADE - TELEGRAPH & KEYS

Att'n Morse Operators: Repros of Bunnell "Acme" resonators. Black pedestal, hoods (drilled for main-line or local sounder), your choice of dark red, gray, WU green, or natural. Felt base, 4-foot cord, $45 includes UPS. No CODs. Jack Proefrock, K6QEQ, 20814 S. Hawaiian Ave., Lakewood, CA 90715/TDC.

Nameplates for Telegraph Apparatus Co. bugs. A small quantity of faithful reproduction nameplates, which include company logo, are available at cost, $7 each with SASE. David R. Pennes, 7410 Noel Road, Indianapolis, IN 46278-1516.

Telegraph equipment bid list available for a SASE. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

SELL/TRADE - TEST GEAR

Selling former high-school electronic test eqpt, with copies of manuals: 4 square-wave/sawtooth generators, 2 four-band RF gens, 12 combined sine/square wave/RF gens, 1 300-volt power supply, 1 300-V pwr supp for parts only. Send long SASE for photos & prices. Alton DuBois, Jr., 67 Peggy Ann Road, Queensbury, NY 12804, (518) 792-3130.

Sell/trade test gear - RF signal generators: B & K E-200D, Eico 324, Eico 330, Eico 315, Knight KG-650, Knight KG-686, Hickok 288X, Conar 280, Realistic 22-040, Lafayette LSG-10. All exc., with manuals. Al Bernard, PO Box 690098, Orlando, FL 32819, (407) 351-5536.

General Radio 1-1000 MHz freq standard, Model 1100A, contains 1101A, 1102A, 1107A, 1112A, 1112B in 75" rack cabinet. A collector's steal at $150, FOB Michigan; H-P 205AG, $15; Tektronix 517A scope with HV supply, $50; Hickok cart for big scope, $30. All plus crating. Joe Keese, W2VSK, 47270 Main St., Northville, MI 48167.

Late '40s - early '50s radio-service test equipment; signal generator, Heathkit scope, Sylvania tube tester, etc. Many radio-TV tubes, new & used. '30s and '40s radio parts. Send for list. John Donelon, 66 Archer Rd., Mahopac, NY 10541.

Heath V-7 VTVM, $45; old vacuum tubes, mostly from '30s and '40s era. SASE for list/prices; Archer analyzer, $10; early H-P 41 calculator with case, $135; Gramercy 500 drafting set w/case, $65. All good cond. & working, plus shipping charges. W. Troyer, 4714 S. Dayton-Brandt Road, New Carlisle, OH 45344.

Services: Repair/replacement of old meters/-galvos - conventional, thermocouple type, hot-wire type, before 1930. Over 400 meters in stock. Trades welcome for services - old meters/galvos, working or not, old electrical books any subject, both before 1920. Ye Olde Meter Cellar, Leonard Cartwright, 113 Sea Terrace Way, Aptos, CA 95003, (408) 662-2977.

SELL/TRADE - TRANSISTOR SETS

Sell/trade "Globe," lacking external hardware; no-name 1950s olive-green pocket transistor trade for exc. early Regency TR-1 or Aeriola Jr. Carl Baxter, 1133 South Clinton Ave., Rochester, NY 14620, (716) 473-5322.

Juliette Model T-612 AM/FM, $10; Realistic Jetstream Mod 12-626AM/ Air $15. Michael Morrell, RT 2, Box 5024, Williston, FL 32696.

SELL/TRADE - TUBES

Old tubes, including Marconi - de Forest audion, Golden VT, Osram-GEC type R2A, Royal Ediswan type R.5, tubular audion type ER, Marconi V24, metal-spray Rogers, etc. $1 for list. Jack Rhodes, 2700 Burdick Ave., Victoria, BC.

Sodion S-13 (open), orig. box, Kellogg 401, Cardon 182B, Arcturus blue 82, Perryman 231 (in box), 71As, 247s, 19s (in box), 120 (open), 245s, UX-240s, 281s, 380s, 101A, 201A, 401A. Still sorting; SASE for list. Also have Vol. II RCA Victor Service Book, 1938-42. Floyd Paul, 1545 Raymond Ave., Glendale, CA 91201, (818) 242-8961

Western Electric xmtg tubes, 701As in orig. packaging, have 6. Black panel 24" x 7", 3/16" thick, with gold screening intact, logo on right side BROWNING-DRAKE - NATIONAL, drilled & control holes labeled. Fred A. Linn, 5608 Edgewater Dr., Cedarburg, WI 53012, (414) 377-3280.

Large stock of tubes, including rare types. Stock of parts for early radios & TV. Vintage test equipment. Will trade or sell for AK radios, parts of AK radios or AK literature. Need Riders Vol. 1-5. Bill Williams, PO Box 63, Regina, KY 41559.

NOS JAN 7203/4CX250B in sealed can, made by Eimac, $75. J. C. Woychowski, 291 Main St., Niantic, CT 06357, (203) 739-6579.

Tubes for sale - 1,292 in stock. Early 30s to late 50s. Send 2-stamp LSASE for 12-page list. Jerry Spets, 1017 Garden Ave. Coeur d' Alene, ID 83814, (208) 667-7914.

WANTED - BC/SW TUBE RADIOS

Admiral portable, 34-FS or 35-G6, both 1940. Brown leatherette w/ slide-rule dial, 2 knobs, horiz. louvers, and handle. Both are in the Admiral ad on p. 49 of McMahon's "Flick of the Switch." Blake Shrout, 7514 Bull Run Drive, Centreville, VA 22020, (703) 830-3330, fax (703) 815-2155.

Farnsworth table radio, AK-58 or AK-59 with C2 chassis, ca. 1939, or AT-10 with C2 chassis. Robert Boat, K7BPS, 16606 Meadow Park Dr., Sun City, AZ 85351.

For 1938 Packard V-12; auto radio and/or control head for Philco P-1635. Arlo Brakel, 201 Deer Meadow, Gahanna, OH 43230, (614) 224-8606.

Any factory-made crystal set. Please make offer with your price and if possible, include photo. Many thanks! Erwin Macho, Ambrosweg 17/A/8, A-1230 Vienna, Austria.

Paragon RA-10, RD-5 and amps. May swap Grebe CR-3. Need Federal DX-58 cabinet. Have list of stuff for sale. Merrill Bancroft, 169 S. Row Rd., Townsend, MA 01469, (508) 597-6623.

Zenith 6-volt DC radio 6-B-107 and remote speaker; Riders Vol. 23. George Bonanno, 34 Charles St., Clifton, NJ 07013, (201) 746-5953.

Zenith wood table radios 6S27, 6S128, 6S137, 8S129 and 10S130. Also other brands of tombstones and cathedrals, any cond. Basket cases OK. James Fisher, 344 Harrison Ave., Manville, NJ 08835, (908) 725-7476..

Workable Atwater Kent 44 receiver. Louis White, 15 Cottage St., Ilion, NY 13357, (315) 894-0510.

1939 RCA chassis RC436 in restorable cond., used in models 40X-50 thru 57. Cabinet not needed. Aaron Hunter, 23 Lenape Trail, Southampton, NJ 08088, (609) 267-3065.

Grebe RORD amp; Michigan Jr. (p. 172, Douglas Vol. 2); Michigan MRC-4 (p. 173); cathedral cabinets including AK 84, 90, 92, 217, 558, 627. Must be in good to mint orig. cond. Don Hovde, 1000 Ashland Ave., Apt. 2, St. Paul Park, MN 55071, (612) 459-9135.

Thompson Minuet R-81 in good or repairable cond. Richard Botzum, RD 2 Box 419, Morgantown, PA 19543, (215) 286-0047.

Paragon RA-10, DA-2 amplifier. Cash, trade, up or down. Ring mic stand, Collins speaker, desk mic. Brian Roberts, 3068 Evergreen Rd., Pittsburgh, PA 15237, (412) 931-4646.

Atwater Kent 33 in good or restorable cond. UX-199 tubes with good emission. Knox Lee, 630 Shadowbrook Drive, Columbia, SC 29210.

Edison radio-phono combo, wkg. orig.; Edison portable disc and Triumph phono w/ cygnet or wood horn; Edison memorabilia. Pictures will be returned. Eastern area preferred. David Edyvean, 2508 Campbell Ave., Schenectady, NY 12306.

Chassis for GE K-63. Junius Bailey, W5FTW, 1002 Reeves St., Abilene, TX 79602, (915) 695-6006.

Marconiphone A2 amplifier, British crystal sets. I will pay top prices. Serious collector not looking for bargains. Ian L. Sanders, 16725 Wild Oak Way, Morgan Hill, CA 95037, (408) 778-7547.

WANTED - COMM GEAR

Hallicrafters SX-100 general-coverage rcvr with speaker. Pilot TV-37 television. Ron Zammit, 469 Campana, Arroyo Grande, CA 93420.

Heath HG-10 VFO with manual. State price please. Don Dye, K0JVE, Box 68, University Park, IA 52595.

Drake 2-B, SW-4 or SW-4A; Hammarlund HQ-140, HQ-150 or HQ-160. Manuals or schematics for Eico 722 VFO, National NC-140 and Globe Champion w/ 812A final. David Lowenstein, N7AF, 236 E. La Jolla Drive, Tempe, AZ 85282.

Transcom transceiver power supply; unusual items relating to C. Francis Jenkins and Walter Winchell. Hal Layer, PO Box 27676, San Francisco, CA 94127.

WANTED - GENERAL

Radio advertising signs, clocks and other items. Have cash or trade items. Rick Yerke, PO Box 392, Moscow, PA 18444, (717) 842-4857.

Atwater Kent lamp with orig. shade, mint. Larry Wright, 131 Hilltop Drive, Lake in the Hills, IL 60102, (708) 658-7328.

Precision EV-20 VTVM; Howard 490 rcvr; SSB adapter for RME 4340 rcvr; Lampkin 105-B micrometer freq meter. Greg Richardson, WA8JPC, PO Box 405, Gallipolis Ferry, WV 25515.

WANTED - INFORMATION

Schematic for Radiola (AC superheterodyne), Model AP-947 (9-40) M. D. Hurwitz, 5000 Robert Andrew Rd., Greensboro, NC 27406.

Info on Raytheon submin tubes 5639, 5702, 5703, and 6021. Need pinouts and characteristics such as voltages, circuits and uses. Alton DuBois, Jr., 67 Peggy Ann Road, Queensbury, NY 12804.

Desperately need schematic and manual on Tektronix 513D oscilloscope. Any info would be appreciated. J. C. Newton, 1952 E. Folk, Williams, OR 97544, (503) 846-6647.

RCA "Midget" schematic wanted. I'm reconditioning Model Q10-3, 5 tubes, ca. 1948. Any help

would be greatly appreciated. Dr. C. Milego, 32 Birch Grove, Windsor, Berks. SL4 5RT, England.

Schematic diagrams & op. instruc. for Signal Corps xmtr BC-625-A. Copies of any info on converting this unit for 6 or 2 meters. Will pay repro & mailing costs. Also, a 6G6 for this unit. Vincent Hueber, 101 Vieau Dr., Syracuse, NY 13207.

WANTED - LITERATURE

Radio & Television News: 1955: Nov., Dec.; 1956; Jan., Feb., March and May. Antique phonos pre-1930 with outside horns. John Whitacre, 2609 Devonshire, Lansing, MI 48910, (517) 482-7996.

Radio Boys books by Allen Chapman. Must have orig. dust jackets. Henry O'Meara, PO Box 384, Honeoye, NY 14471.

The Radio Boys with the Iceberg Patrol by Chapman. Have for trade Radio Boys in the Flying Service by Duffield, R. B. at Ocean Point, R. B. at Mountain Pass, and R. B. with the Forest Rangers, by Chapman. George Kasdorf, Sr., RD 3, Box 251, Lewistown, PA 17044.

Test-instrument catalogs and publications from Weston, Westinghouse, GE, James Biddle. Need Biddle turns-ratio test set. Henry Weiland, 8946 West Grantosa Drive, Milwaukee, WI 53225, (414) 463-4681.

ARRL Handbooks wanted for my collection. 1st, 5th and 16th eds. Bob Schafer, WA7IHN, PO Box 442, Aumsville, OR 97325, (503) 749-1149 eves.

Paying up to $100 (depending on cond.) for book Wireless Telegraphy and High Frequency Electricity by Twining. Harry Goldman, 3 Amy Lane, Queensbury, NY 12804.

Orig. manuals for Hammarlund SP-600. Also SP-300 speaker for same. Any advertising flyers, reviews or articles on SP-600 or Collins 651S-1 rcvr. Anyone owning these two rcvrs, your comments on them appreciated. Robert Ross, VE3JFC, Box 1003, Stn. B, London, Ont., Canada N6A 5K1.

Rider's Vols. 5, 11 and up. Most-Often-Needed Radio Diagrams, Volumes R2 thru R18. Joseph Forth, 321 Long Vue Acres, Wheeling, WV 26003, (304) 277-3154.

Radio Retailing magazines. Especially issues prior to 1933. Doug Heimstead, 1349 Hillcrest Dr., Fridley, MN 55432, (612) 571-1387.

Amateur Callbooks, the "Blue Books" of 1909, 1910, 1911 and 1914. Bob Arrowsmith, W4JNN, PO Box 166, Annandale, VA 22003 or (703) 560-7161 collect.

WANTED - MILITARY

AN/WRR-3 (R-1134) VLF/LF rcvr & Collins R-389/URR in good cond. Would consider other VLF/LF eqpt in good cond.. Seller must be willing to ship (I pay). I could pick up in western upstate NY. Jim Wilson, 35 Belgard St., Rochester, NY 14609, (716) 288-0427 eves. or (716) 726-0952 days.

AN/ARC-5: T-15, T-16, or T-17/ARC-5 MF xmtr, or corresponding ATA model. Offering $100 for good orig., $50 for decent converted. For Navy RBB and/or RBM rcvrs: schematic, or loan of inst. book to copy. Ludwell Sibley, KB2EVN, 44 E. Main St., Flemington, NJ 08822, (908) 782-4894.

WW II Japanese, German, Italian, Australian, British, Canadian radio rcvrs, xmtrs, test eqpt, antennas, DF gear. North Korean eqpt, tuning units for Navy GP-7 and Army Air Force BC-191, BC-375, ART-13 xmtr and BC-348J, N, A rcvr. Alan Mark, PO Box 372, Pembroke, MA 02359.

E. H. Scott military RBO, SLR-12A, REE, RCK, SLRM. Also, manuals/schematics. Thanks! Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429, (713) 260-5842 days.

WANTED - PARTS

Orig. microphone for Webster-Chicago wire recorder #7 (RMA 375). Rider's Manuals Vols. 20 & 21. Loretta Hausmann, KA3QBT, 6256 Montague St., Philadelphia, PA 19135, (215) 333-0116.

For Collins R-388/URR: power transformer, Collins part 672 042900, and chassis-to-front-panel support plate, right side. Charles Storni, 772 Johnson Ave., San Luis Obispo, CA 93401.

Rek-O-Kut S-120 tone arm or playback arm. Needs to be complete. Console cabinet for Ampex 402-403 tape recorder. Gaylord Ewing, 19 E. Main St., PO Box 144, Morris, NY 13808.

Headphones, accessory plugs, jack boxes, advertising, anything related to phones. Pse send list & reasonable price. Have several duplicate sets to trade. Any items related to home long-wire antennas: kits, insulators, lightning arrestors. Dick Mackiewicz, 1549 N. River, Coventry, CT 06238.

Thordarson AF transformers 2:1 ratio, Carter rheostats, 30 and 6 Ω, Carter single-circuit jacks #101, Kellogg condensers ½ and 1 μF. Remler type 600 & 610 coils and Selectone coils 400 & 410. Pse check your parts box. John Meredith, 1644 Parkside Circle, Niceville, FL 32578, (904) 897-7734.

Need power transformer, schematics, or any other information for a Brunswick Model 15. David Hanes, 912 Deer Creek Lane, Ft. Collins, CO 80526, (303) 223-2069.

Chart paper for Esterline-Angus Model AW recorder. Also Esterline-Angus AW, operational or for parts. Roger Moe, 8001 Lateral A Road, Wapato, WA 98951.

Volume control for Zenith 850; has switch on back. Also tone/volume control for Philco 37-610. Decals for above Philco and RCA 18. Also, C pwr 1 and 2 voltage for 1926 Dayfan 5050. Black paper used for speaker cover. Mark Twarozek, 11760 Mile Block Rd., North Collins, NY 14111.

Announce stand for RCA 44-BX microphone (round base V-I6). Marcel Vallee, 703 St. Germain Ouest, Rimouski, Quebec, Canada G5L 3S6.

B & W 160BVL 100-W coil and 3" round 300-mA meter. Vance Gildersleeve, 206 Michelle Dr., Poteau, OK 74953, (918) 647-9044.

Want meter-repair person to repair or adapt a meter movement to case 412-466. Also need output transformer to match 6V6 in push-pull. Tad Drogoski, N3JZQ, 507 Coal Valley Rd., Jefferson Boro, PA 15025-3703.

WANTED - TELEGRAPH & KEYS

Keys, bugs, paddles. Will trade other keys or buy. Particularly looking for old or unusual keyer paddles. John Rehak, N6HI, "The Keyer Paddle Collector," 4035 E. Lavender Lane, Phoenix, AZ 85044, (602) 759-8019

Unusual telegraph speed keys (bugs) wanted, such as Brown Bros. CSA, O. M. Thomas Electric Co., Boulter, Delaney Auto-Dot, Leislers Simplex, The Conkling Key (bug), early Dunnduplexes and Mecographs. Any patent model or other weird contraption classified as a "speed key," for private collection. Gil Schlehman, 335 Indianapolis Ave., Downers Grove, IL 60515, (708) 968-2320.

Mac Keys, Mac Key boxes (w/ or w/o keys), Oscillatone and T. R. McElroy sales literature for personal collection. Tom French, W1IMQ, "The McElroy Collector," 120 Great Road, Maynard, MA 01754.

WANTED - TRANSISTOR SETS

Bulova 250, 640; Toshiba 5TR-193, 6TR-186, 6TR-92; RCA 7-BT-9J; Arvin 9577, 8576; Sony TR-55, TR-63, TR-86; Regency TR-1, TR1-G, TR-4; Mantola M-4D & others. David Mednick, 1450 Palisade Ave. #5-H, Fort Lee, NJ 07024, (201) 461-3082.

WANTED - TUBES

De Forest DV-3A w/ intact filament, with can, if present. Top dollar paid. Charles Swigart, 3717 Burton Ave., Toledo, OH 43612, (419) 478-6818.

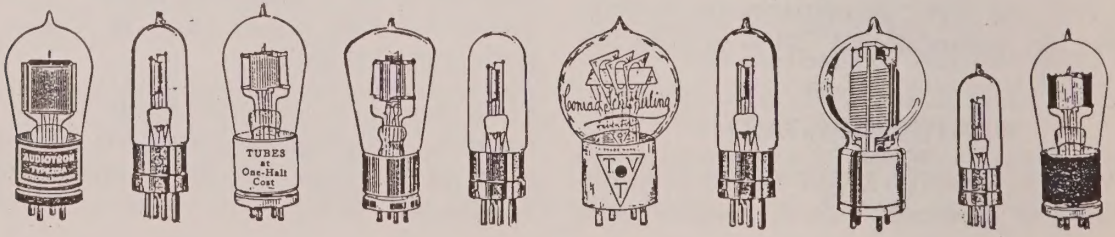
For restoration: Sonora (blue glass) SO-1, RE-1, 125 (ballast), DE-1, RA-1 or Arcturus 40, 48 (blue glass). Good emission required. Also, copper coil shield for Eveready Model 1, 2 or 3 or American Bosch Model 28. John Swett, 29 Zeller Ct., Berea, OH 44017, (216) 234-4980.

(Continued from p. 15)

7184: 6V6GT
7189: 6BQ5
7193: 2C22
7212: 6146 (M)
7244: 6J6 (CM)
7245: 6J4 (CM)
7247: 12DW7
7258: 6AN8
7316: 12AU7
7318: 12AU7 (> I_f) (CM)
7320: 6BQ5 (M)
7408: 6V6GT
7494: 12AX7WA
7543: 6AU6 (low noise)
7581: 6L6GC
7693: 6BH6
7694: 6BJ6
7717: 6CY5 (M)
7724: 14GT8 (M)
7728: 12AT7 (I)
7729: 12AX7 (I)
7730: 12AU7 (I)
7731: 6U8 (I)
7732: 6CB6 (I)
7733: 12BY7 (I)
7734: 6GE8 (CM)
7738: 6AN4 (CM)
7752: 6AS6
7755: 6AJ5
7756: 6AR6
7803: 6FW8 (CM)
7867: 6EF6 (> I_f)
8425A: 6AU6 (I)
8426A: 12AU6 (I)
8532: 6J4 (CM)

(Continued from p. 16)

equipment. They are antiques, and one might ask, "Is it worth attempting to repair them?" There are probably many antique tubes sitting on shelves with broken filaments that have lots of emission left in them. Some of these tube types have not been manufactured in decades, and may be put into service only through this kind of repair. Furthermore, the amateur may use similar techniques to repair broken filaments in modern transmitting tubes under emergency conditions. Perhaps a suitable transducer (coupled to a variable-frequency audio oscillator) can be used instead of a screwdriver handle to vibrate the tube shell in a controlled manner. High-power transmitting tubes are very expensive, and their filaments do sometimes break prematurely. The type of equipment necessary to attempt repair is certainly present in the average amateur station.



BOOK AND MAGAZINE REVIEWS

EDITED BY
Bruce Kelley
59 Main St., Bloomfield, NY 14469

SOUND PRACTICES

Subscription: $16, *Sound Practices*, Box 19302, Alexandria, VA 22320.

A quarterly publication for the vacuum-tube audio buff. I received a copy of this highly specialized publication and it confirmed everything I had heard about the merits and current use of hi-fi vacuum-tube audio amplifiers. Construction articles reminded me of those written 40 to 50 years ago: amplifiers using 2A3s, single-ended 300Bs and 807s, and push-pull 845s. I was fascinated with the current costs of output transformers: $42 to $600. An interesting magazine. (BK)

CATALOG

L-W BOOK SALES - BOOKS ON ANTIQUES AND COLLECTIBLES

L-W Books, PO Box 69, Gas City, IN 46933, 800-777-6450.

This catalog lists about 800 titles in the "collectibles" field, including toy trains, general antiques, Depression glass, paper items, clocks, etc. Radio listings are few but currently "hot": Collecting Transistor Novelty Radios (Breed), Old Radios - Pointers, Pictures, and Prices (Johnson), Antique Radios - Collector's Guide (Bunis), Antique Radio Restoration Guide, 2nd ed. (Johnson), Evolution of the Radio (Wood), Classic Plastic Radios of the 1930s and '40s (Sideli), Radios - The Golden Age (Collins), Radios Redux - Listening in Style (Collins), Lawlor's Radio Values (Lawlor), and Classic TVs, Prewar Through 1950s. These are all widely available through the usual collector sources. The interesting thing about L-W is the pricing: this is a quasi-discount seller, with prices for assorted lots of six or more running about 60% of the usual retail prices. Might be interesting for club bulk purchases, two or more buyers pooling their orders. L-W is the publisher of such items as Evolution of the Radio, a collection of old-time ads, catalog sheets, and present-day color photos of receivers (no text), with a price guide. (LAS - with thanks to Harold Winard for source material)

ALEXANDERSON ALTERNATOR AND 1993 CALENDAR

$12.95 + $2.50 shipping, from John David, KB1T, Box 1015 YB, Amherst, NH 03031.

Once again KB1T's historical calendar is hanging in the AWA Museum. This year's theme, written by Tom Lewis, is the Alexanderson alternator. In addition, there is an abbreviated history of radio communication on a monthly basis. A most unusual calendar loaded with information for the DXer and radio historian. (BK)

CATALOG

1993 - ANTIQUE RADIO LABS

$2.00, from A. R. L., R1, Box 41, Cutler, IN 46920, (317) 268-2214.

This catalog is the latest from Jim Fred's longtime parts-supply business, offering a lot of unique material. This includes custom-made phenolic coil forms in the special six-pin format unique to early National receivers (SW-3, SW-5, SW-45, etc.), along with winding tables for making replacement coils. There are quartz wall clocks in store-display style with Atwater Kent or early-'30s Philco logos; 20 reprints of booklets on building or servicing radios; custom-made housings to replace a can-type electrolytic that is missing from a chassis; a small selection of transmitting tubes; a wide variety of receiving tubes (on an inquiry basis - not catalogued as such); tube bases for converting 864s into WD-11 replacements, and WD-11-to-four-pin adapters. A. R. L. supplies copies of tech manuals for about 125 items of test gear, hi-fi sets, etc., from makers as diverse as Federal, H-P, and Thordarson. For example, ten Eico test sets are covered, 20 Knight-Kits, and 17 Heathkits. Copies of radio diagrams from Rider's, etc. are available. There is even a "Garage Sale" page with, um, *miscellanea* for sale. The catalog is designed in "add-a-page" format, looking toward updates. The first update is out, offering plug-in replacements for the scarce UX-199 tube. A trial order of parts was received promptly and in good condition. (LAS)

LE RADIO POPOLARI (The "People's Sets")

By Enrico Tedeschi

In Italian, 100 pp., 8" x 11-½" xerocopied format, 19,000 lire (≈ $20 U. S.), from the author at Via Acilia 242, casella postale 10, 00125, Rome, Italy.

This is another scrapbook sort of production from the author of Guida del Radiocollectionista, reprinting prewar and modern British-European material on the Nazi and Fascist "People's Sets" and the British "Wartime Civilian Receiver" or "Utility Set." Each of the three is covered in detail. For example, the Volksempfänger VE301 was actually a family of sets: "W," "G," and portable "B" models powered by AC, DC, and batteries respectively. There was also a VE301WnDYN model with small improvements, and a 1945 postwar version by Siemens, made without the swastika. Ger-

man manufacturers offered such variations in their (otherwise standardized) sets as a short-wave feature for the two-tube Deutsche Klein Empfänger (DKE) two-tube set. (For English-language coverage of these sets, see Max de Henseler's four-page *OTB* article, Vol. 25 No. 2, Sept. 1984).

There is naturally lavish coverage of the Italian sets (Radiorurale - Radio Balilla - Radio Roma), replete with copies of vintage photos of small boys dressed up in Fascist uniforms and toy rifles listening to a Radio Balilla set. (There is also the news that the Radio Balilla receiver has been copied in modern times, in a transistor version!). From wartime, there is a copy of Field Marshal Kesselring's order offering jail to Italians caught listening to nonfascist stations, e. g. the BBC.

Lumping the British wartime sets with the fascist ones is unnatural: the prewar German and Italian sets were sponsored by totalitarian governments as a means of consolidating their political power, i. e., of crushing the remaining democratic elements within their countries. The wartime British program was simply an apolitical means of replacing sets destroyed in bombing, etc., just as the U. S. "M-R" tube program was a way to keep civilian receivers working. The author distinguishes the British program from the others on the basis of time period, which is too facile. In any event, there is extensive coverage of the various AC and battery models, their factory-authorized conversion to long-wave operation, etc.

Reproducing all this published material leads to heavy duplication. Mechanically, some of it reaches too far: squeezing 16 pages from the Italian state radio yearbook onto one page gives tiny, smudged type that reads poorly even under a magnifier. Similarly with the *first draft* of Robert Lozier's AWA Review 7 article on the Italian sets: 8:1 compression pagewise just doesn't work. Page composition is, well, sloppy. The ragged typewriter type in the titles, blown up to 42-point size, is funky but doesn't wear well visually. The reprints of modern material are *attributed* but it's not apparent that they are *authorized*.

To sum up, this book captures a wide span of material on these sets, which were socially and politically important in their day, took on the tough design problem of getting decent performance at bare minimum cost, and are "hot" collectibles today. (LAS)

MUSEUM NEWS

MANITOBA AMATEUR RADIO MUSEUM

Vacationing in Canada this year? Visit the Amateur Radio Museum on the grounds of the Manitoba Agriculture Museum in Austin (west of Winnipeg). As with the AWA Museum, admission is free, open from May through October 1, with generous hours of 9:00 AM - 5:00 PM daily. The curator, Dave Snydal, VE4XN, has on display radio artifacts dating from 1900 to present. Site is 1-½ mi. south of Hwy. No. 1 on Hwy. 34. For more information, write Manitoba Amateur Radio Museum, Box 10, Austin, Manitoba R0H 0C0, Canada; or phone the curator at (204) 728-2463. (BK)

PAVEK MUSEUM OF BROADCASTING

This museum in Minneapolis recently scored a public-relations win by getting written up as the cover story of the Feb. 1993 "buying guide" issue of *Radio World* - with a mouth-watering cover photo of a mint AK 1055C console.

The museum, starting from the radio collection of the late Joseph Pavek, W0OEP, has expanded to covering Minnesota broadcasting history, providing public-outreach programs, maintaining a research library, and hosting Northland Antique Radio Club events. The museum publishes an excellent contribution-supported "newsletter" which, currently at 12 full-size pages of historical articles, is far more than a newsletter.

The museum is at 3515-17 Raleigh Ave., St. Louis Park, MN 55416-0030, (612) 926-8198. Hours are the same year-round: Tuesday-Friday, 10 AM - 6 PM; Saturday, 9 AM - noon; closed Sunday and Monday. St Louis Park is effectively a continuation of Minneapolis, so it's close in. (LAS)

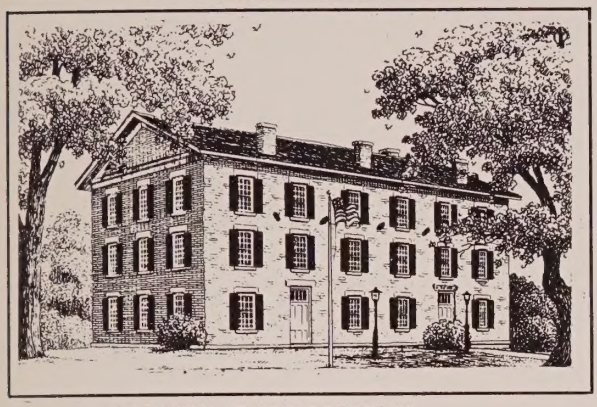
WESTERN HERITAGE MUSEUM

This museum, located in the restored art-deco Union Station in Omaha, is a major general public facility with heavy coverage of local history, a large coin collection, and - for our purposes - the Leo Meyerson/QCWA collection of radio material. Meyerson, familiar to amateur-radio collectors as W0GFQ and head of World Radio Labs and Galaxy Electronics in Omaha, has contributed extensively to a collection that began in 1970 with early de Forest material donated by the late Art Trauffer (*OTB*, Vol. 16, No. 4).

In recent months the museum has had a temporary exhibit of 200+ radios, plus an audion and other early tubes, a spark transmitter, WRL gear, and communication receivers (Breting, Hallicrafters, Howard, National, RME). Plans are underway for a major permanent communications exhibit incorporating amateur and professional radio, along with wireline material from the Telephone Pioneers, to be finished next year. A working amateur station is to be included.

Hours, Sept.-May: Tues.-Sat., 10 AM - 5 PM; Sunday, 1-5 PM. Hours, June-August: Same, plus Monday. Location: 801 S. 10th St., Omaha, NE 68108-3299, (402) 444-5071, admission, $3. (LAS)

THE MUSEUM



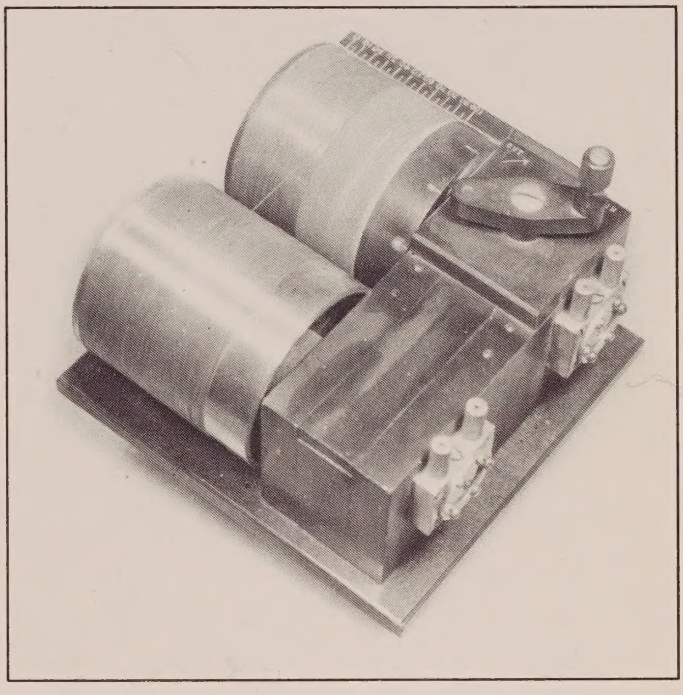
AWA ELECTRONIC COMMUNICATION MUSEUM

Location: Village Green, NY 5 & US 20, Bloomfield, New York
Hours: May 1 through October 31: Sunday, 2-5 PM; also, June 1 - August 31: Saturday, 2-4 PM and Wednesday, 7-9 PM. (Closed Holidays)
Group tours: by appointment
Museum telephone: 716-657-6260
Amateur Station: W2AN
Mailing Address: Bruce Kelley, Curator, 59 Main St., Bloomfield, NY 14469
FREE ADMISSION

VARIABLE INDUCTOR IN THE AWA MUSEUM

This odd tuning device was developed about 1909 by the Massie Wireless Telegraph Company for use in receivers.

The Massie inductor is mounted on a heavy slate base with an enclosed gear box. The right-hand coil form is of bakelite and has a threaded groove of 100 turns for the wire. The left-hand form is brass with a groove of a similar number of turns. By turning the crank at the upper right, the operator could either wind up the wire, increasing inductance, or decrease by winding in the opposite direction and shorting the wire on the metal coil form. A scale giving the number of turns is at the upper right. I think this is a rather expensive method for tuning a receiver: it would be simpler to use tapped switches or a sliding contact. Does anyone have additional information on this device? If really used in an early receiver, what type? -BK



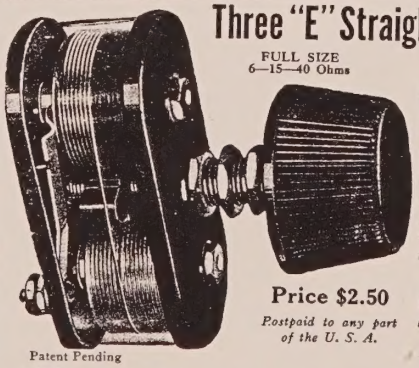
NEW MILITARY EXHIBIT

Annex workers have set up a new WW II military display with emphasis on radio equipment used in the B-17 bomber. Pieces include a BC-375 transmitter, BC-348 receiver, and SCR-522 transceiver. An interesting side exhibit is a complete radio installation for a Russian tank. A reminder: the AWA Review and past issues of the *OTB* are available at the Museum, as well as Tom Lewis' book Empire of the Air.

NEW GEAR

Albert Abramson; Mary Applegate; Jim Dates, W2QLI; Al Jones, K6DIA; Sid Miller, WA1DOU; Bill Plimpton, W2IXH; George Pugsley, W6ZZ; Dr. Walter Smartt; John Walker; Ralph Williams, N3VT; ARC Films Ltd. and Bell Communications Research, Inc. (cash donations).

Three "E" Straight Line Rheostat



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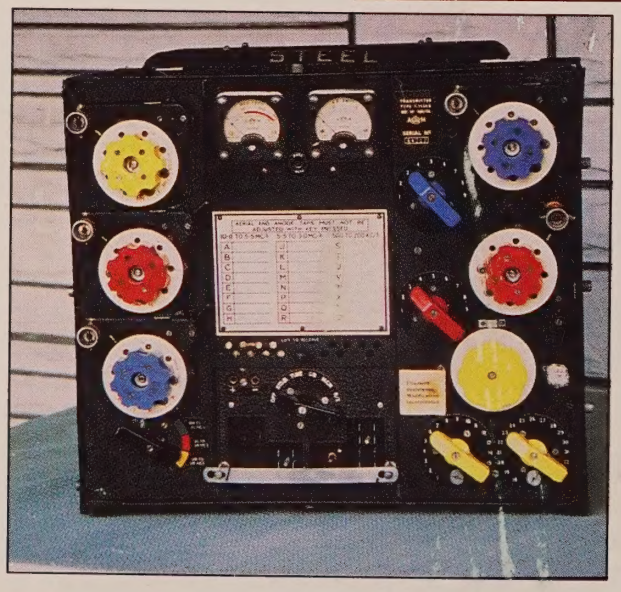
What works for inductors, works for rheostats.

JUST PIX

(For "The Museum," see the inside rear cover)

For the record, here are AWA's officers. Left to right: Bruce Kelley, curator; Richard Ransley, first VP; Bill Fizette, second VP; Dexter Deeley, treasurer; Bruce Roloson, president; center, Joyce Peckham, secretary. Not shown: Sherwood Snyder, attorney.

A variegated display of home radios, phonos, and television sets in the AWA Museum.



The RAF (and RCAF) T1154 transmitter described in Louis Meulstee's listing of T1154/R1155 variants in this issue. This is Lloyd Swackhammer's T1154N, S/N 44217 - note the designation "STEEL" on the case top. The color-coded controls are intended to aid an operator under stress: yellow is for the 200-500 kHz band; red, 3.0-5.5 MHz; blue, 5.5-10 MHz. This particular set was seen in the 1988 Equipment Contest at Canandaigua. *Swackhammer photo.*